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November 1909

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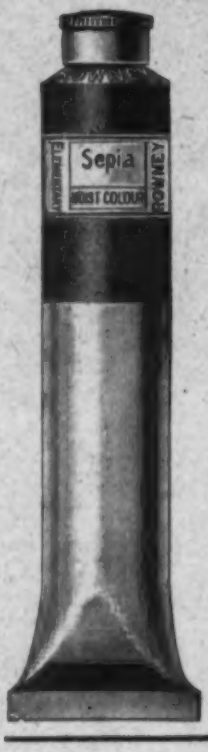

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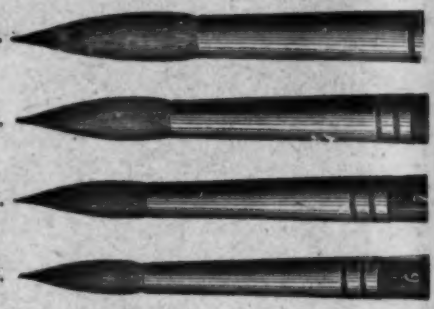

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Educational Opinion.

THE new Syllabus of Physical Exercises issued by the Board of Education marks another step forward, and away from the wooden, stiff, drill-sergeant exercises of our boyhood. It is remarkable as recognising two principles for which some few enthusiasts have been working for a long time, generally earning unsparing condemnation as "cranks," but slowly and surely bringing the principles nearer and nearer to general acceptance. One of them is, that physical exercise to be good should be free, easy, and supple, with an entire absence of stiffness. The non-recognition of this principle in exercise has brought about the devotion to rigid gymnastic muscular exercises and the stiff movements of squad drill, none of which are good from a physiological or æsthetic point of view. The other, even a more notable advance, is that physical exercise should be joyous, exhilarating, and healthfully stimulating. Let those who remember their drilling exercises in youth speak to the amount of joyous exhilaration they caused. The fact that "drill" was, and is yet, the favourite means of punishment in many schools, speaks volumes for the "joy" evoked by that particular form of exercise. The new syllabus would be a notable one if it contained no other novelty than that—the official recognition of joyfulness as a desirable characteristic of school instruction. Truly we are travelling far from the time of the austere dominie, the ferule, and the birch; and who will say that it is not for the better?

The New Syllabus.

THE introduction is almost a model of the way in which a vast amount of information can be packed in a small compass. It will do good service in calling attention to the real advantages which may be expected from properly conducted exercises, and still better service in the warnings against improper use which it gives. This part of school life demands as much knowledge, care, and previous training as any other.

Some of its Points.

Another good point in the syllabus is the attention it directs to breathing exercises. Only those who have studied a class of children closely and for a long time can be aware of the amount of mental dullness and intellectual inertia which exists, due in the majority of cases to imperfect breathing. At times physical defect, curable, but often passed over, is there, which can only be discovered when systematic attention is paid to the simple but vital act of breathing. And many a child has been condemned as stupid and hopeless on this account. The all-importance of the exercise is insisted on, and its value pointed out by the position given to it in the tables of exercises.

We imagine also that teachers will welcome the hints given for the building up of further schemes of exercise, so that familiarity need not necessarily beget staleness and lack of interest. And one other point is too good to be passed over—the incorporation in the tables of exercises of a recreative element, the use of dancing steps and skipping steps, pleasurable in themselves, and leading to beautiful combined movements. For there is a real element of beauty, of fine control, in some of these which has been absent too long from the physical exercises of the school.

A last word of praise is due to the illustration, by photograph and diagram, of the correct pose and action to be aimed at.

WE should like to draw special attention to two books which deserve wide reading by all teachers. The first is a book by Professor J. W. Allen on *The Place of History in Education*, recently reviewed in full in these columns. It is written by one who has full knowledge of his subject, and will stimulate thought wherever it is known. The discussion of methods of study and the place and value of history is admirable—full of point and suggestion. But its use is not confined to discussions which might remain academic, and never influence practice; it teems with practical hints for use in class and school, hints that are worth studying and worth applying. The problem of what and how to teach up to the age of fourteen, respecting history, is a difficult one, as many a teacher has discovered for himself, and Professor Allen's book may in this particular prove a godsend.

Hints on Books.

The second is on *The Higher Education of Boys in England*—a symposium by two secondary schoolmasters, assisted by twenty-two other contributors, of whom one is the well-known head of one of the higher elementary schools of Manchester. The book is at once destructive and constructive—critical of existing things, and suggestive of reforms that are both desirable and practical. The matter of the book affects primary and secondary schools alike; for the shading off of the work of the primary school into that of the secondary, and the systematisation of the work of the secondary stage, are two of the most crying needs of English education. Until this is done we shall never have a "system," but always the muddle which we pathetically call by that name. Still it is significant of the movement of the times that such a book should appear.

THIS column seems a fitting place to call attention to the extraordinary fate which has fallen upon a famous teacher, Señor Ferrer of Barcelona. He was the founder of "the Modern School" in that city—a school which is perhaps the best in Catalonia. Also he was the originator and prime mover in the foundation of a system of "lay" schools in the province, which have tried to fight against the monopolisation of the elementary stage of education by the orders of regular clergy in Spain. There is, of course, a so-called national system of schools, wretchedly installed and equipped, and staffed by perhaps the worst paid and least considered body of teachers in Europe. Attendance is supposed to be compulsory, but nothing justifies the supposition. Señor Ferrer and his colleagues incurred the odium both of the monks and the Government, and he, at least, has paid for their temerity by death following court-martial. He was widely known in Europe through his educational activity, and much resentment has been aroused by his fate. It is a curious price to pay for zeal in the public interest, and illustrates once again the queerness of life in the Peninsula. To teachers the case is one of poignant interest.

A Persecuted Teacher.

BRITISH MUSEUM

THE case of the fully trained and qualified college student has been so often urged in these columns that we might be tempted to apologise for returning to it once more. did we not think that all our readers will agree that no apology is necessary. Cases of real hardship, caused by the glut of trained students poured out on the market, are constantly coming to our knowledge—cases where no fault attaches to the persons concerned. They are well trained, and in some cases possess distinct capacity in special directions; but no opening can be found. Certificated teachers in numbers are accepting posts at the pay of the uncertificated. Six teachers were recently appointed by an authority in the home counties, and over seven hundred applications were received. Application lists of two and three hundred for a single post, poorly paid, are of common occurrence. One of two things is urgently necessary —either a drastic overhauling of the training colleges, with a view to limiting the output, or a quickening of Mr. Runciman's circular concerning the size of classes and the supply of supplementary teachers. For during the period when supply and demand are adjusting themselves, intense hardship is being caused.

Hard Cases.

THE third International Congress of School Hygiene is announced to be held at Paris in the spring of next year. The preliminary statement contains an imposing array of names of French publicists and educationists who are actively engaged in preparing for the success of the meeting. The honorary president is the Minister of Education, and his supporters are amongst the best-known men in France. Large national committees are already formed for most countries, and others are in process of formation, so that the gathering will represent pretty well the entire world. The British committee is already strong, and the contingent from this country is sure to be large, though it will not compare with the army coming from the United States. The last Congress was held in London in 1907. It attracted much attention, and did good work. The two aims of the Congress, which are modestly stated as "the hygiene of childhood and the improvement of educational routine," represent a fine ideal and cover an immense field. Congresses are often sterile assemblies, but this particular one moves so much in accord with a spirit which is stirring in the educational world just now that it deserves to be very fertile in results. The English secretaries are Dr. Kerr, the medical officer (Education) of the London County Council, and E. White Wallis.

The Congress on Hygiene.

THE whirligig of time brings in his revenges. In this country the education of girls, and the action of women's "movements," are tending to take women more and more out into the big struggle of the outside world, so long considered as the province of man alone. One of the best known among women educators in America, hailing from Columbia University, has recently been in England, and she tells a tale which is just the opposite to the British one. In the States they are harking back from the free and untrammelled position of women in the world at large, commercial and otherwise, to the education for home life which it seems the ambition of many to abandon. And so the problem of an education which shall bring back the woman to the position of house and home ruler is very much to the fore at present. It is certainly curious that on the two sides of the Atlantic the question of the educational activities which shall be brought to bear on girls should thus be reversed—in the one case away from, in the other towards, a home education. As Miss Crawford put it—as each necessity becomes pre-eminent, the cry is always "salvation by something or other." Now it is "salvation by cooking!" It brings home very clearly one fact which is often passed over—the danger of *copying* the educational practices of another country. Each, as it is conditioned by its own immediate needs, must work out its own salvation.

A Quaint Contrast.

A QUAINT comment on the foregoing is the announcement made in the reign of Queen Anne by a fashionable schoolmistress of Highgate, that "young gentlewomen will be soberly educated and taught in all sorts of learnings fit for them, as also *raising of paste*, and all sorts of housewifery." The only thing about this curriculum that was light was the pastry. But what is to be said of the programme of a rival schoolmistress hailing from Hoxton Square, who taught "reading, dancing, musick, writing, marking, shell-work, filligrew, paper-work, cross-stich, Irish-stich, and plain tent-stich, sattin-stich, point and plain work, and all things fitting for the accomplishment of young ladies." With such a list of accomplishments it would be rude to mention spelling—or the raising of paste!

When Queen Anne was alive.

THE RED CODE.

As good wine needs no bush, so the Red Code (the title suggests Border warfare) needs no recommendation of ours. It is, as our readers know very well, the N.U.T. edition of the official marching orders, edited by Sir James Yoxall and Mr. Ernest Gray, and it has now reached its seventeenth year of issue. In the present year the clauses of the Children Act, 1908, to which education authorities, officials, and teachers will need to make frequent reference, are set forth in full, and the publications of the Welsh Department of the Board of Education are inserted in such a form as to clearly indicate their resemblance or contrast with the English editions.

THE SEWING-MACHINE IN THE SCHOOLS.

OUR lady readers already know that the recently-issued Circular 730 recommends that a wider use of the sewing-machine should be made in the schools. The suggestion has our hearty approval, provided that public money is not spent on worthless machines. This is tantamount to saying that the Singer machine ought to be supplied for the purpose, for the name is a guarantee not only of workmanship and durability, but also of ease in working as well as of perfection in modern equipment. The Singer "66" seems to us to meet all the requirements of an ordinary school most satisfactorily, being the lightest running lock-stitch machine ever placed upon the market, while the fittings supplied will enable the user to do all kinds of needlework. Our readers will find a Singer shop in every town and city, and the inspection of this latest model will be an easy matter. They are recommended to ask to see also the portable hand-machine No. 28K.

THE PATH OF DUTY.

A RECORD OF A VISIT TO THE ROYAL MILITARY SCHOOL AT GUSTON, NEAR DOVER.

BY "OBSERVER."

THE Duke of York's Royal Military School was, up to the present year, a London institution, and familiar to many people who knew nothing and cared rather less about its founder. It has now been transported from Chelsea, and, like M. Blériot, has alighted in an open, breezy meadow outside Dover, where the coming winter will at least serve to teach its inmates a fine appreciation of Kingsley's "Ode to the North-East Wind."

It is, however, typical of the bracing moral atmosphere, that North-easter. For in this school the first subject in the curriculum and in the time-table is Duty. In every classroom, conspicuous among the pictures on the walls, is a portrait of His Majesty, representing not himself (as he would be the first to tell the "Dukies"), but the land over which he rules, and to which our paramount duty is due. Nelson's famous signal and Sir Henry Lawrence's last words, "I have tried to do my duty," are conspicuous on the walls. Kipling's glorious "Recessional," and the rules of the National League of Courtesy, were also frequently met with. The only serious omission among these incentives was a portrait of the "Duke of Duty."

Our illustration gives a good general idea of the disposition of the buildings which make up what we might fittingly describe as Yorkville. By kind permission of the commandant, Colonel Morris, C.M.G., D.S.O., I had the pleasure of making a tour of inspection near the end of September, and a more genuine treat for a prowling educationist it would be difficult to imagine. Duty and dirt are the positive and negative of life, and from dormitory to chapel absolute cleanliness was the order of the day. Let us follow a little "Dukie" from the rising of the sun until "lights out."

His sleep has been sound, for each dormitory with its twenty beds has ample air space, and the Guston air is, I should imagine, an excellent sleeping draught. He rises at 6 a.m., and after using a bathroom such as the royal founder never saw, has breakfast at 7.30 in an oak wainscoted banqueting hall fit for a king. His food comes from kitchens which I had the pleasure of inspecting, and I wish I could assure myself that all the food I have eaten in town hotels and restaurants came from similar quarters. The assurance would be better than Yorkshire Relish.

From 8.5 to 8.45 the boy is engaged either at drill, gymnastics, gunnery, musketry, or instrumental music, under specially qualified instructors; for he must enter the ranks when his time comes fit to go on doing his duty. It is not surprising that the list of old boys includes the names of officers of high standing and signal service. The difference between a "Dukie" recruit and an ordinary one must be something to ponder over.

After prayers, conducted by the chaplain, the Rev. G. H. Andrews, M.A., who has held the post for fifteen years, the boy takes his place in school, and is hard at work until 12.15. The number on the roll is 510, and there is a staff consisting of headmaster (Mr. R. Dark, B.A., Oxon.), ten masters, a mistress for the junior school, and a teacher of science, drawing, and woodwork respectively. I had the pleasure of visiting the classrooms and workshop in turn, and noting the mental effect of the physical discipline, the atmosphere of alertness and brightness which is fostered by careful attention to health, and by the life which is lived by rule.

The budding soldier dines at 12.45, under the eyes of His Majesty, Lord Roberts, the founder of the school, and other notabilities, and resumes his studies an hour later. At 3.30 a number of his fellow-pupils commence manual work, some to ply the hammer or the nimble needle, others to darn their socks. I watched one bright-faced small boy manipulate a hole in a sock equal in area to the sole of his boot, with a cheerfulness void of all responsibility.

School work ceases at 4.30, and the pupil is then free to amuse himself, which he does, whenever possible, in the open air—the playground is on the same generous scale as the rest of the institution; but there is also a playroom provided with games of various kinds for wet weather. After tea the great event is the opening of the swimming bath, which measures 84 feet by 45 feet. Every boy must learn to swim, and each student in training (see below) must be able to accomplish three lengths of the bath before the completion of his college course.

I was specially interested in the arrangement for keeping the water fresh in this bath. It is renewed weekly, but there is no cheap and dirty day, as there used to be at many of our public institutions. The

water is in continual circulation, running out to be filtered and aerated by an ingenious contrivance, and then passing back into the bath with its freshness renewed. The advantage is obvious, and with memories of Friday in a town bath I wished myself a boy once more, and a "Dukie" boy, too. The gymnasium, a spacious, well-lighted hall, adjoins the swimming bath, and is on the same handsome scale as the rest of the equipment.

Now, in spite of all the care taken of him, our budding soldier sometimes falls sick, when he is haled off to a hospital, which appeared to me to be a distinct incentive to shamming; but then I have "come to forty year," and appreciate a "haunt of peace," especially if it is clean. There were three or four little invalids when I walked through the wards—an abscess, a sick eye (the companion eye was very bright and twinkling), and one case of "all-overishness." Nothing serious, one was glad to note—nothing to qualify the soldierly "All's well!"

The Duke of York's School is not only a place of education for future soldiers—it is also a training college for army schoolmasters; and I was privileged to see the students at work, preparing for the task of training the best of the nation's soldiers. They take the complete college course, and their working day lasts from 6 a.m. to 10.15 p.m. The monitors are another important feature in the school organisation. Their ages range from fourteen to seventeen, and they are prepared for the examination for entrance as students in training at one of the three military schools—Guston, Dublin, and Dunblane. This examination is purely one of open competition; but although there are on an average ten candidates for a vacancy, it is rare that a monitor is not found in one of the first three places in order of merit.

To conclude my tour of inspection on the proper note, I visited the college chapel, which can readily be distinguished in the centre of our picture. It is very handsome and very new, but its newness is toned down by the presence of two alabaster tablets bearing the names of "Dukies" who have fallen in battle from the time of the war in the Crimea to that in South Africa. And, in spite of the newness, the spirit is here which stirs the blood in the oldest of old cathedrals—the same as had stirred me in the glorious church at Canterbury, which I had visited only a few days before. It is well expressed in Henry Newbolt's poem:—

> "This is the Chapel: here, my son,
> Your father thought the thoughts of youth,
> And heard the words that one by one
> The touch of Life has turned to truth.
> Here, in a day that is not far,
> You too may speak with noble ghosts,
> Of manhood and the vows of war
> You made before the Lord of Hosts."

The chapel suggests some mention of the "pious founder" of the institution—namely, Frederick, Duke of York, the second son of King George the Third, who smelt powder in Flanders in 1793, fought a duel on Wimbledon Common where his side curl was grazed, was fond of shooting and horse-riding, and, on irrefutable evidence, went regularly to church. These achievements pale before the fact that he won the Derby twice, and was a three-bottle man!

But he founded the Royal Military Asylum at Chelsea in 1801, during the Napoleonic wars, for the sons of soldiers, and by starting a public subscription had the satisfaction of shaming the House of Commons into taking action, when all the subscriptions were returned to their donors.

Names of would-be "Dukies" can be registered between the ages of eight and eleven, but applications for admission cannot be considered until applicants reach the age of nine, or after they attain the age of eleven. They must be sons of soldiers or ex-soldiers, physically efficient, free from any deformity or defect, and likely to become fit for the army. Preference is given to orphans, then to those whose fathers have been killed or have died on foreign service, next to those who have lost their mothers, and lastly, to those boys with both parents, but whose fathers have been ordered on foreign service, or who have other children to maintain.

THE ADOLESCENT.

At the recent Assistants' Conference at Northampton, the President, Mr. T. H. J. Underdown of Bristol, dealt ably and lucidly with the adolescent problems, and came to the following conclusion:—

Our voluntary system, as rapidly and as smoothly as possible, must give place to a scheme of compulsory attendance at continuation schools, for those under eighteen years of age. This is no new principle. We stand in this matter to-day where we stood forty years ago when the State, realising the ineffectiveness of voluntary attendance at the primary day school, adopted compulsory attendance under the Act of 1870. First of all, a statutory limitation upon the hours of labour for those under eighteen is necessary, leaving a reasonable margin for further training as well as for rest and recreation. The minority report of the Royal Commission on the Poor Law favours thirty hours per week at work and thirty hours of school. But this is too drastic for a first step. It should be the employer's duty to afford facilities, and the duty of the Local Education Authority to make arrangements, for the school to meet at a time which will best suit the local conditions of labour.

In making these changes the legislator will probably find it necessary, and most certainly convenient, to take public opinion along with him, and for this reason the system of local option in the Scotch Education Act of last year will stand the best chance of success in Parliament. But this would widen the gulf already existing between the most progressive and the most reactionary of our local authorities, and would indefinitely postpone any advance in many towns and in almost every county. The more statesmanlike step therefore appears to be a moderate compulsory advance enforced by the Legislature, allowing a margin for local bye-laws. Many issues are involved—the provision of exemption for those who have attended full time at day school until sixteen, and for those who are receiving approved instruction in business methods, in the principles of a skilled trade, and the like. These must wait until we come to close grips with the definite proposals. Then we must keep this principle before us: that the State must insist upon every adolescent worker receiving adequate preparation for an adult calling.

In the nature and scope of this training we are not likely to repeat our former mistakes in catering mostly for the embryo clerk to the neglect of the manual worker. The courses of study need to show greater versatility. The humanities, literature, art, physical and technical training must each have a fair field. The study of a trade, in practice and theory, if placed on a fair level with the professions, would do much to restore manual labour to the former status it occupied in the Middle Ages, and to check that juvenile snobbery of to-day which drives droves of our young people into those so-called genteel but poorly-paid occupations. But while the avocational side secures due prominence, the way must be open to a higher education, leading to a fuller appreciation of all that is best in art, science, and literature. Not only must the adolescent be put in a fair way of earning his living, but he must be taught how to live.

Important New Building for Kingsway.—Owing to the ever-increasing demand for their celebrated productions, the well-known house of Messrs. L. and C. Hardtmuth have decided to erect a building worthy of the magnitude of their business in Kingsway. This fine erection will be commenced shortly from the designs of Mr. J. S. Gibson, of 5 Old Bond Street, the builder being Mr. James Carmichael of Wandsworth. It is superfluous to add that Messrs. L. and C. Hardtmuth are the world-renowned manufacturers of pencils, including the celebrated Koh-i-Noor pencils, besides being the sole European representatives for Waterman's Ideal Fountain Pens. The building will bear the appropriate title of "Koh-i-Noor House."

The New Constructive Movement.

SUGGESTIONS FROM AMERICAN SCHOOLS.

BY W. H. WINCH, M.A.

"WHAT'S in a name?" asked Shakespeare, and then informed us that a rose by any other name would smell as sweet. Well, to the analytical psychologist, it doubtless does; but to children, savages, successful advertisers, and the average person, it does not seem to do so. It would be interesting to inquire the cash value of such names as Sunlight, Mazawattee, and other appellations which modern advertising never lets us forget. And if there is a difference felt and sensed in such elementary cases as these, we may be fairly sure that, where the names have a background of meaning, as well as of vague and emotional implications, the names themselves are vastly of importance. Is it mere accident, for example, that America calls its woodwork classes neither manual training, nor handicraft, nor technical work, but "shop"? You may not find the word very often in the official courses of instruction, nor do theorists on education use it; but "shop" it is, both for boys and teachers, in the schools themselves. And "shop," you perhaps know, does not mean in America the place where things are kept and sold. All over the United States such a place is called a "store," not a "shop." A shop is a place where things are made for purposes of use and sale. And we can see at once how the mere name forces to the front the idea that things—useful things, useful for use, not merely for educational purposes—are to be produced; completed things, not merely steps in a course of training.

I do not wish to be understood as giving a wholehearted acquiescence to this view, but I wish my reader to note it *en passant*.

Let us turn to this country. Our name in most general use for work of that kind is "manual training." What does this imply? Fundamentally, I take it, by the unconscious suggestive influence of the mere name, it implies and sets up in us, more or less subconsciously, two notions. First, that the work in question is an affair of the hand—a mechanical thing. Secondly, that the important thing about it is not the making of things, but the cultivation of dexterity, which shall be available, not merely for the making again of the models and exercises which have already been made, but for other handwork—the later handwork of industrial life, whether in wood or metal or leather, or in any handicraft whatsoever.

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SPANNING THE GULF;

OR, KINDERGARTEN INSTRUCTION FOR THE UPPER STANDARDS.

BY H. G. STYLES.

(*Continued from page 181.*)

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The New Constructive Movement.

SUGGESTIONS FROM AMERICAN SCHOOLS.

BY W. H. WINCH, M.A.

"WHAT'S in a name?" asked Shakespeare, and then informed us that a rose by any other name would smell as sweet. Well, to the analytical psychologist, it doubtless does; but to children, savages, successful advertisers, and the average person, it does not seem to do so. It would be interesting to inquire the cash value of such names as Sunlight, Mazawattee, and other appellations which modern advertising never lets us forget. And if there is a difference felt and sensed in such elementary cases as these, we may be fairly sure that, where the names have a background of meaning, as well as of vague and emotional implications, the names themselves are vastly of importance. Is it mere accident, for example, that America calls its woodwork classes neither manual training, nor handicraft, nor technical work, but "shop"? You may not find the word very often in the official courses of instruction, nor do theorists on education use it; but "shop" it is, both for boys and teachers, in the schools themselves. And "shop," you perhaps know, does not mean in America the place where things are kept and sold. All over the United States such a place is called a "store," not a "shop." A shop is a place where things are made for purposes of use and sale. And we can see at once how the mere name forces to the front the idea that things—useful things, useful for use, not merely for educational purposes—are to be produced; completed things, not merely steps in a course of training.

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Ex. 2. To find from Ex. 1 the length of your pace in yards.
Ex. 3. To find out how many paces equal 50 yards.
Ex. 4. Step a number of paces equal to your answer in Ex. 3, and then measure with tape to see how far you are wrong.
Ex. 5. Note two objects:—
(*a*) Guess the distance between them.
(*b*) Pace the distance between them.
(*c*) Measure the distance between them.
Ex. 6. (*a*) Take three pegs—sticks or cricket stumps—and try to place them 20 yards, 50 yards, and 60 yards apart.
(*b*) Pace the distances, and alter if necessary.
(*c*) Measure with tape, and test the result.
Ex. 7. Select a row of trees which appear to be nearly the same distance apart.
(*a*) Guess the distances apart.
(*b*) Pace the distances apart.
(*c*) Measure the distances with tape.
(*d*) Find the average distance apart.
Ex. 8. Use the average distance found in Ex. 7 to find the total number of yards between the first and last tree. Then test your answer by actual measurement with tape.
Ex. 9. (Pencil compasses required.) Select three trees growing thus:—

A

B

C

Or place three sticks is a similar position, so that the shortest distance is at least 15 yards.
(*a*) Draw a diagram of the triangular spaces enclosed by lines joining A, B, C.
(*b*) Enlarge the diagram to twice the size, or, if too large, to one and a half times the size.
(Use method for describing a triangle when the three sides are given.)
Ex. 10. Place four sticks so as to form a square having sides three feet long. Use your set-square to obtain the right angles at the corners, and fasten a piece of string to each stick one foot apart.
Answer these questions:—
(*a*) What is the area of the big square?
(*b*) How many small squares are there?
(*c*) What is the area of each?
(*d*) Draw a diagram of the whole, using 1½ inches to represent one foot.

A large number of similar exercises on length will suggest themselves to the teacher, so I will not give more. It will be found a good plan to print a number of such exercises on sheets of paper with the cyclostyle, and give each lad a copy. They will then be able to work almost unaided, thus leaving the teacher more time to deal with the duller ones. The sheets should be preserved, and afterwards fastened together in book form for other years. During the winter months, when open-air work is impossible, the time should be devoted to the making of models, apparatus, diagrams to scale, charts, finished drawings, etc., using the statistics obtained during the spring, summer, and autumn, as suggested later on.

On wet days during the year the continuity of the work must be kept up by such exercises as I have suggested for the winter, otherwise the interest will flag.

I will now show how the previous exercises are performed in the open air, using the exact working from some of the best exercise books.

Every diagram used is the work of the pupil whose name is attached, and though some of these have been elaborated in school or at home, most of them appear as done in the open air.

Ex. 1. When I walk 20 yards I take 21 paces.
Ex. 2. 21 paces equal 20 yards.

$\therefore$ 1 pace equals $\frac{20}{21}$ yards.

Ex. 3. $\frac{20}{21}$ yards equal 1 pace.

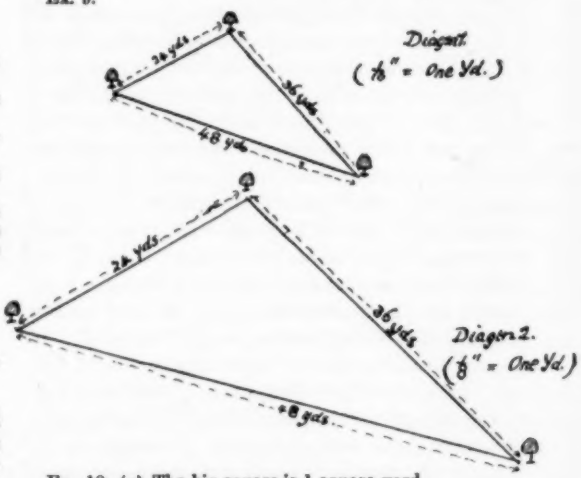
1 yard equals $\frac{1 \times 21}{20}$ paces.

$\therefore$ 50 yards equal $\frac{1 \times 21 \times 50}{20} = 52\frac{1}{2}$ paces.

Ex. 5. I guessed the distance to be 120 yards.
I paced the distance to be 88 yards.
I measured the distance to be 85 yards.
Ex. 7. I guessed the distances to be:—
1st distance, 8 yards.
2nd „ 9 „
3rd „ 9 „
4th „ 10 „
I paced the distances to be:—
1st distance, 9 paces.
2nd „ 9 „
3rd „ 11 „
4th „ 8 „
I measured the distances to be:—
1st distance, 8½ yards.
2nd „ 8½ „
3rd „ 10 „
4th „ 8 „

35 ÷ 4 = 8¾ yards, average distance.

Ex. 9.



Ex. 10. (*a*) The big square is 1 square yard.
(*b*) There are nine small squares in it.
(*c*) Each small square is a square foot.

It will be observed that the pupil is made to record his observations in complete sentences, but as briefly as possible, the aim being terseness of expression, with a methodical arrangement of ideas. This is a valuable training, and tends to develop a scientific mode of reasoning.

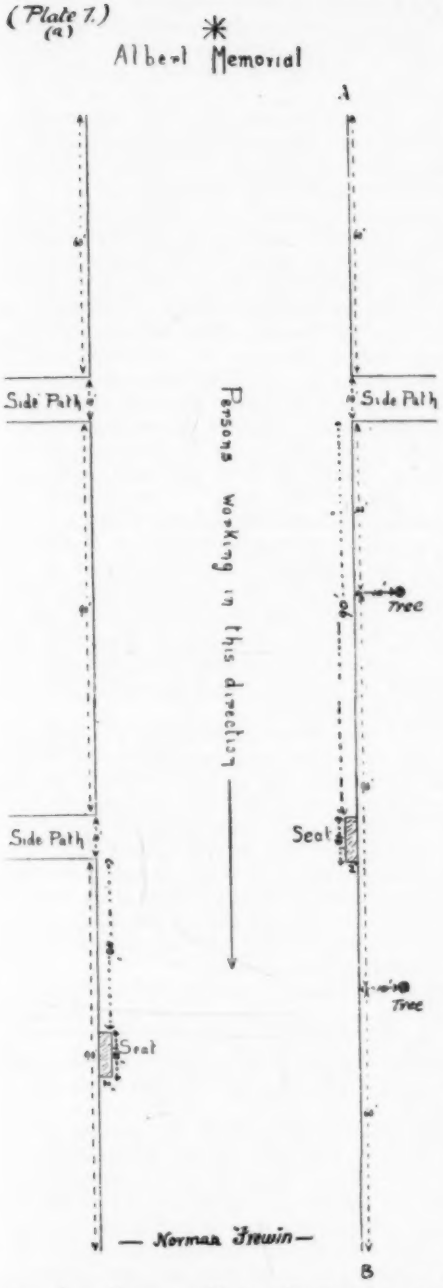
To encourage this method of setting out work, it will be found helpful to print skeleton exercises, calling upon the pupil to copy the formulæ, but using his own figures. This is very desirable in the case of beginners.

The pupil having had some practice in using the tape-measure may now attempt a simple plan of a road or path across a park. It is very important in work of this kind to keep up the interest of the pupil, and this is best done by varying the exercises as much as possible. The two following exercises are quite within the powers of the average lad who understands how to represent a distance to a given scale, and is able to manipulate compass, ruler, and set-square; and, though it is not likely that the same exercises will be attempted, it is quite conceivable that similar ones will be to hand in either town or country.

Ex. 11. *To measure and draw to scale a portion of the path leading from the Albert Memorial to the Bronze Statue.*

Plate 1*a* is a reproduction of this exercise from one of the boys' exercise books. It will be seen from the

(Plate 7.)
(a)



accompanying diagram (Plate 1*b*) that the lads are drawn up in a row facing the direction they are about to work. Two of the number then use the tape, the class watching while the teacher superintends the operations and repeats aloud the dimensions called out by one of the two boys using the tape.

I may here point out that the privilege of measuring with the tape is coveted by all the boys, and therefore comes in handy as a reward for good work. At the same time, sooner or later, every boy must have practice in using the tape himself. One other matter. We use two kinds of tapes—one an ordinary English surveyor's tape, the other a French tape marked with metres and decimetres.

Now, in an exercise of this kind, the first thing is to decide upon a suitable scale. In this you will be determined by the size of the paper and the dimensions of the surface under survey. The paper we use is 15″ × 11½″.

It will prevent much waste of time if the difficulty is presented to the class in the following manner :—

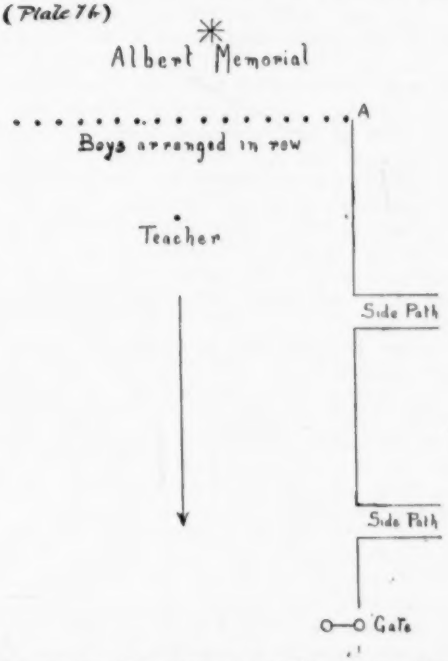
Length, 15 ins. = 30 hf.-ins. = 60 qr.-ins. = 120 eighths of paper.
Width, 11 ins. = 22 hf.-ins. = 44 qr.-ins. = 88 eighths of paper.

From the above it is seen that the following dimensions *only* can be represented :—

Scale.	Greatest Length.	Greatest Width.
1″ = foot.	15 feet.	11 feet.
½″ = „	30 „	22 „
¼″ = „	60 „	44 „
⅛″ = „	120 „	88 „

A table should be drawn up on paper and pasted on millboard for future reference, or the same might be

(Plate 7*b*)



written out on first page of exercise book. Later on the same should be done using the metric system. With this in his possession the pupil will have a very good guide as to the scale he may safely adopt when about to begin a survey. It is very desirable, however, that several lessons on scales—using both English and metric system—should be given in class. Further, a number of scales made on strips of cardboard about 12″ × 1½″, and fastened together with rubber bands, will not only prove a good series of indoor exercises when open-air work is impossible, but will also enable the pupil to attempt plans to scales other than those dependent upon the 12-inch ruler. For instance, we decided to take about 100 yards of the path. This meant 300 feet to 15″, the latter being the limits of the paper. The boys soon saw that if 300 feet had to be represented by 15″, then $\frac{15}{300}$″—that is, $\frac{1}{20}$″ would have to represent a foot.

We therefore settled on a scale of 1″ to 20 feet. The next step was to find a length for each foot. This was done by drawing a line 1″ long, and dividing it into twenty parts by the usual method.

COMPULSORY CONTINUATION SCHOOLS.

BY AN INSPECTOR OF SCHOOLS.

THE Consultative Committee of the Board of Education was asked in April 1907 to consider whether compulsory continuation schools for England and Wales could be set up on the lines of the Scottish measure of 1907, and also to consider the means for securing an increased attendance at evening schools, as well as the possibility of securing the co-operation of employers and others concerned in arranging facilities therefor.

Their exhaustive report is now to hand, and valuable and authoritative as it is *per se*, its importance is considerably enhanced by reason of its coming hotfoot upon the recent Poor Law Report, and because it endorses the findings of the commissioners on the common problems which were approached, be it remembered from entirely different standpoints. Sir Robert Morant strikes the keynote to the report in the preface in these words: "It is universally admitted that educational questions lie at the root of many of the most important social problems. Of late, especially, improvements in the provision made for continued education, after the age up to which attendance at school is at present compulsory, have been widely advocated as tending to stimulate commercial and industrial progress, and as being likely to have a direct bearing on the whole question of unemployment." Philanthropists have long recognised the gravity of the social problem of the adolescent of the wage-earning classes. Religious denominations and other bodies have, by clubs, guilds, brigades, etc., attempted to grapple with the spiritual and moral side. In this connection we must do honour to Robert Raikes, the founder of Sunday schools in England; to Sir George Williams, to whose evangelical piety and long-sustained self-sacrifice we owe the establishment of the Y.M.C.A.; to Dr. Paton, whose powerful advocacy has done so much to extend the humanitarian side of continuation school work; and to Mr. Russell of Manchester and the Rev. Spencer Gibbs of Stockport, whose efforts in connection with boys' clubs have been so successful. The Board of Education and local authorities have catered for the educational welfare of these boys and girls, and with much success, since the famous Acland Evening School Code of 1903.

Meanwhile the cause has received much impetus through the forceful writings of Mr. and Mrs. Sidney Webb (*Industrial Democracy*, 1902), Professor Sadler (*Continuation Schools in England and Elsewhere*, 1907), and Messrs. Bray, Creasey, and others. But, in spite of all these efforts, only one in four leaving day schools continues his education.

The adoption of a compulsory continuation school system in Scotland has lifted the matter out of the plane of academic discussion, so far as these islands are concerned, and the predominant partner, having at length discovered what Germany saw in 1870—namely, the connection between an educated community and trade supremacy—and having in the recent report the whole of the available evidence focussed, will be able to take definite action in due course.

As a result of their labours, the Committee make the following recommendations:—

1. The day school education must be improved by—

(*a*) Smaller classes;

(*b*) An improved staff of teachers;

(*c*) Less academic and more practical instruction, with opportunities for private study and less exposition;

(*d*) More attention to physical training, including organised games.

2. The day school exemption age must be raised at once to thirteen, and shortly to fourteen, and half-time attendance must be abolished. In this connection it is interesting to learn that, although the leaving age is now nominally fourteen, no less than 170,000 children between twelve and fourteen manage to obtain exemption. As only 1.43 per cent. of the whole number of workers are between twelve and fourteen, no great trade inconvenience is likely to result from these recommendations. In Scotland these reforms are already in existence; and in Glasgow, out of 100,000 children in the primary schools, only sixty exemptions are allowed in each year below the age of fourteen, and in each case the condition is attendance at an evening school.

3. The provisions of the Employment of Children Act (1903) should be more generally adopted. This Act is at present little used. It was passed to lessen the appalling drain on the energies of day school pupils caused by exhausting employments out of school hours. Down to 1907, however, only two county authorities, thirty-two county boroughs, twenty-eight boroughs, and four urban districts had adopted the Act. Last month the Home Secretary appointed a departmental committee to inquire into its operation, and indicated his earnestness by taking the unprecedented course of placing his wife thereon.

4. Junior employment registries to give skilled advice to parents, managers, and teachers in the selection of suitable occupations for children between the time of leaving the day school and their seventeenth birthday, should be established, and switched on to national labour exchanges. The Munich Labour Exchange finds 53,000 situations annually at an average cost of 9d. each.

5. The day school teacher's interest in the continuation schools should be sought, and his assistance in teaching will often be needed, but due care should be taken to avoid overstrain in such cases.

6. Until attendance at evening schools is made compulsory, the following suggestions may be helpful in improving the voluntary system:—

(*a*) Effective practical encouragement from employers, in the shape of allowing time off from work, etc., should be invited.

(*b*) Systematic visitation of the parents of children about to leave the day school. At Halifax the chief attendance officer forwards every Saturday to the organiser of the evening schools a list of the scholars who have left the day schools during the current week. On the following Monday morning one of the organiser's clerks visits the home of each boy, and points out the advantages of attending the evening school. During four weeks in October and November 1907 sixty-six per cent. of the boys leaving the Halifax day schools immediately joined the evening schools.

7. Boys and girls should be encouraged to attend continuation schools during the closing months of the day school course.

8. The Committee, believing, however, that no entirely voluntary system will be sufficiently effective, recommend that compulsory attendance shall be enforced under restricted conditions similar to those existing in Scotland.

9. It should be the statutory duty of every employer

of young persons under seventeen years of age to give facilities for their attendance at continuation classes. That this will have no detrimental effect upon trade generally is shown by the fact that already fourteen out of the sixteen railway companies, together with several other large branches of industry—for example, Cadbury's; Lever Brothers; Brunner, Mond and Co.—offer facilities to their employees to attend evening schools. One firm declares that the resultant renewed energy fully repays for the time lost.

10. The curriculum at these continuation schools, besides giving effective training for the duties of citizenship, should have reference to the crafts and industries practised in localities. Prominence should be given to practical and manual instruction, and to systematic physical training.

GEOGRAPHY NOTES UP-TO-DATE.

BY E. R. WETHEY, M.A., F.R.G.S.

Peary's North Pole.

AT the time of writing the notes on "Cook's Pole" in last month's *Practical Teacher* the news of Peary's enterprise had not, in the modern language of Polar explorers, vibrated southward through the crisp Labrador air. It is necessary, therefore, to set against the Cook account the message sent by his great rival. The chief incidents, as picked out from the lengthy telegrams supplied to the press, may be transcribed chronologically:—

1908. July 6.—Commander Peary left New York for the North Pole.

Aug. 1.—Arrived Cape York in the *Roosevelt*.

Aug. 8.—Left Etah to search out winter quarters on the N.E. corner of Grant Land. Cape Sheridan was the spot selected, and here the expedition went into retreat on September 5, with plentiful supplies of musk ox and bear at hand. The place was named "Hubbardsville."

1909. Feb. 15.—Started from Hubbardsville for the North with 23 sledges, 140 dogs, 59 Eskimos, and his own party of seven. Various causes, of course, soon began to split up this somewhat large expedition: relief parties claimed some, accidents others.

Mar. 2.—Passed the British record, Markham's 82° 20′ (1876).

Mar. 28.—Passed the highest record, Peary's own, 87° 6′ (1906).

Apr. 2.—Passed latitude 88°, and dismissed the last of his white men, Captain Bartlett, the Britisher, much to the latter's sorrow. But the American was bound, in the nature of Americanism, to finish alone, or, at all events, with none but Eskimos.

Apr. 4.—Passed latitude 89°; temperature, –40° F.: air "keen as frozen steel."

Apr. 6.—Arrived North Pole (140 miles in the last four days!); stayed there thirty hours; temperature ranged from –33° to –12°. Soundings 5 miles off the Pole showed no bottom at 1,500 fathoms, and the wire broke. No land anywhere; one Eskimo with Peary at the Pole; three others and his negro, Hensen, near by.

Apr. 27.—Returned to Cape Sheridan.

Sept. 6.—In communication once more with the civilised world. This communication took the form of wireless telegrams from Battle Harbour, Labrador, to Cape Ray, Newfoundland. The first two were the briefest and the most striking: "Pole reached, *Roosevelt* safe," and "Stars and Stripes nailed North Pole."

Then followed the inevitable but withal undignified controversy as to whether Cook or Peary, or both or neither, discovered the North Pole. And the controversy is still with us, and is likely to remain with us yet awhile, nor can any definite pronouncement be made until the facts and figures, and data and observations of the two explorers be placed before the scientific world. Both men have excellent testimonials and excellent credentials. Dr. Cook's we gave last month. Commander Peary has practically spent the last twenty years in the Arctic regions. He began in 1886 with an exploration of the interior ice-cap of Greenland, and in 1891–92 he proved the insularity of the great Danish Northland. From 1893 to 1902 he made several expeditions to the vicinity of Cape York, and visited the curious Arctic "Highlanders" of his famous narratives, and pushed forward as far as lat. 84° 17′. All this was by way of preparation for his ultimate object. In 1906 he made the then world's record of lat. 87° 6′. In 1908, just before going on board the steamer at New York, he said that with luck he would reach the Pole in the winter of 1908–9, and communicate his achievement to the world between August 15 and September 15, 1909. This programme he appears to have carried out in detail. And then this "controversy"! Oh, the pity of it! After all these three hundred years of Arctic heroism the quest of the Pole apparently fizzles out in an anti-climax worthy of the hustings, farcical almost, and even blatant. Vote for Cook! Vote for Peary! and the Stars and Stripes on the nail! But if the *dénouement* rights both the rivals, what an *annus mirabilis* 1909 will have been, and what a tablet of names to go down the ages—Sven Hedin, Stein, Shackleton, Cook, Peary!

SPECIAL NOTICE.

The Editor hopes to commence in an early issue a Tutorial Column for Students preparing for the Lower Certificate of the Froebel Institute, which is now so popular with Education Authorities. The column will be conducted by a successful tutor of wide experience in the work of preparing students for this examination, and the Editor would be much obliged if readers will kindly make it known to non-subscribers engaged in Kindergarten and Infants' School work.

FAR AND NEAR.

INTERESTING ITEMS, CHIEFLY FROM THE PERIODICALS.

A Hint for Nature Workers.

IN the heart of the old capital of Middlesex—Brentford—is St. George's School. To the ordinary observer the chief features of the town are the gas works, the water works, and the never-ending stream of motor cars which whirl along as fast as the traffic will allow them through the High Street, which is part of the great Bath Road. In fact, no one would think that much Nature-study work would be possible in the place unless one were to cross the river into the wilder parts of Kew Gardens. Nevertheless, the second mistress, who has grasped the right idea of Nature study, found that behind one of the private houses that still remain were some fields, and persuaded her head mistress to approach the owner on the subject of allowing the children to use his fields for Nature-study work. This she did at a time when he had been rather successful in business, and was likely to feel magnanimous, and the result was that he gave practically unrestricted facilities for entering his grounds.—*The Country Home.*

* * *

The Educated Person.

SPEAKING to the students at Manchester University the other day, Lord Morley said that he would like to find out what constituted an educated person. He ventured to think that an educated person should be one who knew what was evidence—when a thing was proved, and when it was not. Another attribute of the educated in his opinion was the ability to know how many different interpretations could be borne by the same verbal proposition—what weight was to be attached to different authorities. Then he thought that an educated person should be able to say how far circumstances should guide one in the application of abstract principles to concrete cases, and how far circumstances transformed propositions which were excellent at certain times and places, but irrelevant patchwork when applied to all sorts of times and places. He had been led to believe that parallels and analogies from history were the most deceptive things in the world.—*The Times.*

* * *

G. K. Chesterton on the North Pole.

IN America, I fancy, it is thought virile and patriotic to send State messages in a sort of slang; to announce to the slightly-puzzled nations that your opponent is "offering them a gold brick"—whatever that is. I find it hard to connect it with my own merely local and traditional notions of a naval officer. I find it difficult to imagine an English captain discovering a cape and telegraphing to his admiral, "What 'o, she bumps!" But in this there is no matter of principle, but merely of national habit. Nevertheless, the Polar quarrel itself and the slanging, self-advertising style in which it is conducted fall so far below the old idealism that the actual discovery of the Pole seems not so much a climax as an anti-climax. As to which of them has really done it, I have no opinion, nor even any preference. Cook did it in the presence of two Eskimos, Peary in the presence of one Eskimo; but if they had done it in the presence of a million Eskimos, such people could give no evidence as to whether it was the North Pole. It is as if Babbage had proved his calculating machine to the satisfaction of a tribe of Hottentots, or Newton had demonstrated the calculi without any refutation from the infant school. In fact, the noise of the discussion seems a singular contrast to the stillness and secrecy of the discovery. Both these distinguished Americans seem to have gone on tip-toe, as it were—more as if they wanted to hide the North Pole than to find it.—*Illustrated London News.*

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The Armed Camp of Europe.

SIDE by side with the attention which our modern State is giving to the Army is the literary bias against all things naval and military. By a very curious coincidence, while the recent manœuvres have been in progress, Mr. Maurice Hewlett, who declines to be interviewed by his countrymen, has been confiding to the clever American woman who is contributing a series of articles on English life to the *New York Sun*, that "the talk about *Dreadnoughts* is a symptom of childishness." "We are not civilised at all," he went on to say. "We are children in looking at only the one side of war. We see the pennants flying, and hear the music of the bands. War to us means the spectacular. We are of the Middle Ages still. But we don't think that drunkenness is spectacular. We think it is revolting, and brutal, and disgusting. War is all that. It is merely drunkenness on a large scale. It is brutality *en masse*."—*The Graphic.*

* * *

A President on a Cow-catcher.

SCRIBNER'S MAGAZINE publishes "the only illustrated account" of ex-President Roosevelt's African tour, and it makes excellent reading this month. It is interesting to note how completely the White House is left behind. "On the seat over the cow-catcher it was literally like passing through a vast zoological garden. Indeed, no such railway journey can be taken on any other line in any other land. At one time we passed a herd of a dozen or so of great giraffes, cows, and calves, cantering along through the open woods a couple of hundred yards to the right of the train. Again, still closer, four waterbuck cows, their big ears thrown forward, stared at us without moving until we had passed. Hartebeests were everywhere; one herd was on the track, and when the engine whistled they bucked and sprang with ungainly agility, and galloped clear of the danger. A long-tailed straw-coloured monkey ran from one tree to another. Huge black ostriches appeared from time to time. Once a troop of impalla, close by the track, took fright, and as the beautiful creatures fled we saw now one and now another bound clear over the high bushes. A herd of zebra clattered across a cutting of the line not a hundred yards ahead of the train; the whistle hurried their progress, but only for a moment, and as we passed they were already turning round to graze. The wild creatures were in their sanctuary, and they knew it. Some of the settlers have at times grumbled at this game reserve being kept of such size; but surely it is one of the most valuable possessions the country could have. The lack of water in parts, the prevalence in other parts of diseases harmful to both civilised man and domestic cattle, render this great tract of country the home of all homes for the wild creatures of the waste. The protection given these wild creatures is genuine, not nominal; they are preserved, not for the pleasure of the few, but for the good of all who choose to see this strange and attractive spectacle; and from this nursery and breeding-ground the overflow keeps up the stock of game in the adjacent land, to the benefit of the settler to whom the game gives fresh meat, and to the benefit of the whole country because of the attraction it furnishes to all who desire to visit a veritable happy hunting-ground."

* * *

The Children's Bedtime.

A CURIOUS experiment is being tried by the little town of Bergen, in Norway. It has issued a bye-law ordering that all children are to be in bed by a certain hour. Those who are sceptical as to the power of municipal authorities to regulate the details of our domestic life will at once perceive some obvious difficulties in the administration of this very well-intentioned regulation. Children of different ages go to bed at different times. Do the authorities of Bergen prescribe one unvarying hour of retiring for the toddling child of three, the urchin of eight, and the girl of twelve? And who is to discover any contravention of the law? We can imagine that the visits of "bedtime inspectors" might be welcomed by tired mothers, weary of the nightly struggle with wide-awake children who are always certain that the most delightful time of the twenty-four hours is enjoyed by the "grown-ups" when the smaller members of the family have been consigned to the night nursery. But in sober earnest such an invasion of domestic privacy seems hardly a possible expedient.—*Daily News.*

* * *

Tennyson's Boyhood.

WITH regard to the alleged unhappiness of Tennyson's boyhood, it may be safely asserted that a sensitive child is seldom light-hearted; and when a high imaginativeness is superimposed upon a sensitive soul, it is impossible that childhood should be happy, except in the legendary story-book sense. Hearken to Charles Lamb, who, always remaining a child, knew better than most: "Dear little T. H., who of all children has been brought up with the most scrupulous exclusion of every taint of superstition—who was never allowed to hear of goblin or apparition, or scarcely to be told of bad men, or to read or hear of any distressing story—finds all this world of fear, from which he has been so rigidly excluded *ab extra*, in his own 'thick-coming fancies;' and from his little midnight pillow this nurse-child of optimism will start at shapes, unborrowed of tradition, in sweats, to which the reveries of the cell-damned murderer are tranquillity."

Tennyson was singularly sensitive, for instance, to the idea of vastness. The thought of endlessness obsessed him in childhood, and furnished him with many a fine simile in later life, when his nature, naturally robust, had joined hands with science, philosophy, and religion to make him, if less the essential poet, more the essential man. But in spite of its training qualities—for we might not have had our Tennyson without it—one would gladly save a beloved child from the intolerable burden of the thought of eternity. Doubtless this habit of dwelling upon thoughts too big for him—

> "Cloud-towers by ghostly masons wrought,
> A gulf that ever shuts and gapes,
> A hand that points, and palled shapes
> In shadowy thoroughfares of thought"—

largely accounts for the young poet's fits of terrible despondency, and for his morbid thoughts of death.—*Dr. William Barry, in "The Bookman."*

THREE hundred years ago Hudson sailed from Holland on his third voyage in search of a sea passage to Asia through America, at the invitation of the Dutch East India Company. The vessel in which he sailed was a flat-bottomed, tublike yacht, such as plied the shallows of Holland. On March 25 (April 6, new style) this cumbersome craft swung out of the Zuider Zee, and after a very eventful voyage the *Half Moon*—for that was the name of the ship—anchored on September 2 at the entrance to New York Harbour, not far from where the Goddess of Liberty holds forth her great arm to-day. Four days later, Hudson sent Colman, one of his crew, and four other men to sound what is known as Hell Gate. These men were attacked by Indians, and Colman was killed. He was buried at the place named after him—Colman's Point. The *Half Moon* continued to proceed up the river which now bears the explorer's name, but was then called the Cahohatea. It is curious to reflect that as Hudson was then in quest of a north-west passage to China, New York has really been celebrating a failure. For although Hudson subsequently lost his life in Hudson Bay in vain pursuit of his quest, the result of his discoveries has marked him out as one of the world's famous explorers. At the mouth of the Hudson River was founded a little Dutch trading post, from which has grown the great city of New York.—*The Graphic.*

A Notable Tercentenary.

SCRIBNER for October gives a list of President Roosevelt's books in the Pigskin Library which accompanies him. The titles may interest our readers:—Bible; Apocrypha; Borrow: *Bible in Spain, Zingali, Lavengro, Wild Wales*, and *The Romany Rye*; Shakespeare; Spenser: *Faerie Queen*; Marlowe; Mahan: *Sea Power*; Macaulay: History, Essays, and Poems; Homer: *Iliad*, and *Odyssey.*; *La Chanson de Roland*; *Nibelungenlied*; Carlyle: *Frederick the Great*; Shelley: Poems; Bacon: Essays; Lowell: Literary Essays and *Biglow Papers*; Emerson: Poems; Longfellow; Tennyson; Poe: Tales and Poems; Keats; Milton: *Paradise Lost* (Books I. and II.); Dante: *Inferno* (Carlyle's translation); Holmes: *Autocrat* and *Over the Teacups*; Bret Harte: Poems, *Tales of the Argonauts*, and *Luck of Roaring Camp*; Browning: Selections; Crothers: *Gentle Reader*; Mark Twain: *Huckleberry Finn* and *Tom Sawyer*; Bunyan's *Pilgrim's Progress*; Euripides (Murray's translation): *Hippolytus* and *Bacchæ*; *The Federalist*; Gregorovius: *Rome*; Scott: *Legend of Montrose, Guy Mannering, Waverley, Rob Roy*, and *Antiquary*; Cooper: *Pilot* and *Two Admirals*; Froissart; Percy's *Reliques*; Thackeray's *Vanity Fair* and *Pendennis*; Dickens: *Mutual Friend* and *Pickwick*. We confess to utter and complete ignorance of Crothers, but intend to make his immediate acquaintance.

The Pigskin Library.

HYACINTHS ripen earliest and flower earliest amongst bulbs which grow indoors, therefore they are chosen for growing in water, but they answer quite as well if potted, and, like other potted bulbs, should be buried under coal ashes or kept in a cool dark cellar for from a month to six weeks after potting. As soon as a crown begins to show, they may be gradually brought nearer to the light, until they stand full in the open window. When growing bulbs in glasses it is important that the water used shall be soft, and that a piece of charcoal shall be placed at the bottom of the vase to keep the water sweet. The bulb should only just touch the surface of the water, but the supply should be kept up as the water evaporates.

For Bulb Growers.

Better than glasses and water, and much more picturesque to look at, are bowls of pretty ware filled with cocoanut fibre with which is mixed a little shell, charcoal, etc., the fibre being purchasable in small bags. These bowls may stand about in a room wherever there is light enough; if large, they may stand on the floor, and all that is needed is to keep the fibre just moist—not wet.—*Lucy H. Yates, in "The Country Home."*

IT is not easy to think of noise as protective, as sheltering, not invading, aiding and not upsetting the processes of the mind. The dweller in towns is apt to regard noise as at best a nuisance, usually a torment, sometimes as perilous to sanity. Yet it is not always so, as experience testifies to me.

Noise that Protects.

I am in the irregular habit of taking railway journeys of some five or six hours, towards the interior of the State, by a rather leisurely road, on which the "chairs" are rarely all taken and the attendants, from sheer lack of occupation, show an interested curiosity as to travellers who affect that luxury. I have found these journeys excellent occasions for pretty stiff reading. I have devoted them to the analysis of troublesome documents, to the disentangling of the threads of contentious argument, or, with equal success and more reward, to the study of unusually baffling passages in a foreign language. When the latter has been a matter of re-reading, the result has been particularly satisfactory. The meaning of my author—I recall with peculiar delight the chapter of Montaigne on "Friendship," with which I had had a tough struggle at home—has become not only clear but familiar, has bred a pleasing sense of intimacy with him, has left with me a permanent and fruitful impression, from which has sprung a distinct influence on my view of life and on life itself.—*Scribner's Magazine.*

I REALLY think a new word is required to describe adequately and agreeably, not women in general, but the individual woman. Remember the difficulties under which the ordinary man labours when he is introduced to a pair of sisters. Perhaps he has heard one of them paints, and desires to discover her. A mother and other relatives being present, he cannot very well ask, "Which of you two is the artist?" "Which of you two young women" has a suspicion of familiarity; "Which of you two girls" is worse. "Which of you two young ladies" (undeniably old-fashioned too) is spoilt by its association with the shop counter, and nothing else is left—not even the atrocity, without charm and courtesy, like the German "*frauenzimmer.*" In days gone by men had a larger choice of terms of address. *Maiden* and *damsel* could both be thus employed, as well as *lady*, with a complimentary prefix; but at present, when our chief pride is a limited and commonplace vocabulary, it is undoubtedly a difficulty to find suitable modes of expressing what we mean. Now that full justice has been done by Lord Rosebery to Dr. Johnson, it may be worth while to read the dictionary (not Johnson's, but Murray's New English) so that we may bring some neglected words into use once more.—*Black and White.*

Wanted, a New Word.

IN connection with the development of China, Mr. R. T. Turley writes to *The Sphere* from Mukden, Manchuria, *vid* Siberia, under date February 1, 1909:—

"I am sending you two pictures of our school children; all are quite blind excepting one. This is the only school for the blind in all Manchuria, and I believe that there are only about half a dozen such schools in all the Chinese Empire, and probably those altogether contain less than two hundred pupils. Our school is intended for girls, although we have three little boys at present as well. The lot of blind girls in this land is a terribly hard one, even if they are allowed to live at all. Boys and men fare comparatively well, as they usually become, if non-Christian, fortune-tellers; but if Christian, then they must be taught to get an honest livelihood.

"We find our children very good pupils, obedient and attentive, and that they learn to read and write much more quickly and thoroughly than children of the same age in our own more greatly-favoured land. When they first come to us they have no idea of music and no voices, yet with but little training most of them learn to sing splendidly, and some learn to play the organ and other European instruments. Those in the pictures can sing from memory some fifty or more of our popular hymn tunes to hymns in Chinese. We teach no English. They also pick up readily such tunes as 'Robin Adair' and 'Scots wha hae.'"

Schools in China.

AGRICULTURAL EDUCATION.

A SCHEME OF WORK FOR RURAL SCHOOLS.

BY W. FRANCIS RANKINE.

Work for the Month.—Apparently November offers little of interest to the scheme of rural school work. Certainly outdoor work is limited, yet many lessons are possible with reference to those important operations that proceed in the fall of the year. The most prominent working is the ploughing of clover leys preparatory to the seeding of winter wheat. This introduces the subject of rotation of crops and the relation of the plant to the soil. Then stubbles are turned up, and the fields are left in the condition of a bare fallow for the winter. Another interesting operation is the lifting of the root crops and their subsequent storage. Roots enter largely into the economy of the farm.

The following outlines are suggestions for November lessons :—

1. *Ploughing.*—The construction of a plough. Horse ploughs and steam ploughs. The action of the plough. Width, depth, and shape of furrows. Plans of fields, showing the course taken in ploughing. (See Fream's *Elements of Agriculture*, p. 42.)

2. *Winter Wheat.*—Preparation of the seed bed. Seeding. The drill. Width between rows. Amount of seed used per acre.

3. *Germination of Wheat.*—Sketches of radicle and plumule at different periods of development. Mode of rooting. Germinating capacity, and how it is determined. Purity of samples.

4. *Mangel.*—Comparison with beetroot. Botanical features. Food value. Uses. Storage.

5. *Rotation of Crops.*—See notes below.

Rotation of Crops.

This important operation is demonstrated by recording the crops grown in fields adjacent to the school year by year. Thus it is seen that changes are made annually. The chief reasons of these changes are (1) to increase the vigour of the crops, (2) to avoid pests that are incidental to certain crops, and (3) to economise labour. It is clear that if one kind of plant were grown in one field year after year the soil would lose its food value. In this case the replenishing of the field would mean heavy expenditure on manure. On some especially good soils wheat may be grown without a break. In such cases deep ploughing—usually steam ploughing—is essential, and judicious soil feeding is demanded. The question of pests is also a weighty reason for changing the crops. If a crop is infested during one season, it is absolutely necessary to replace it with another the next year.

Careful observations have proved that a four years' course or rotation is the best practice. This is particularly interesting since it introduces many lessons on plant life and soil physics. It may be connected with the work carried on in the school garden, where rotation is practised on a smaller scale. The accompanying diagram indicates the progress of the rotation. The circle represents a cycle of four years. This is subdivided into sixteen sections to represent the seasons. Commencing at A, which stands for some time in late autumn, we have the seeding of wheat. This is harvested in the early autumn of the following year (shown at B). Soon after this the stubble is ploughed. In the spring of the next year roots are sown (C). These are lifted and stored in the autumn of the same year (D). Again the field is ploughed, and left as a fallow through the winter. In the following spring barley is seeded (E), and soon

Plan of Fields to Record Rotations.
Compare with Rotation Diagram.

after this is completed clover is sown (F) on the same field. The reason for this will appear later. In the autumn the barley is harvested (G), and the clover is left to develop. This completes the cycle, and with this ideal rotation the soil is kept in sound condition, pests

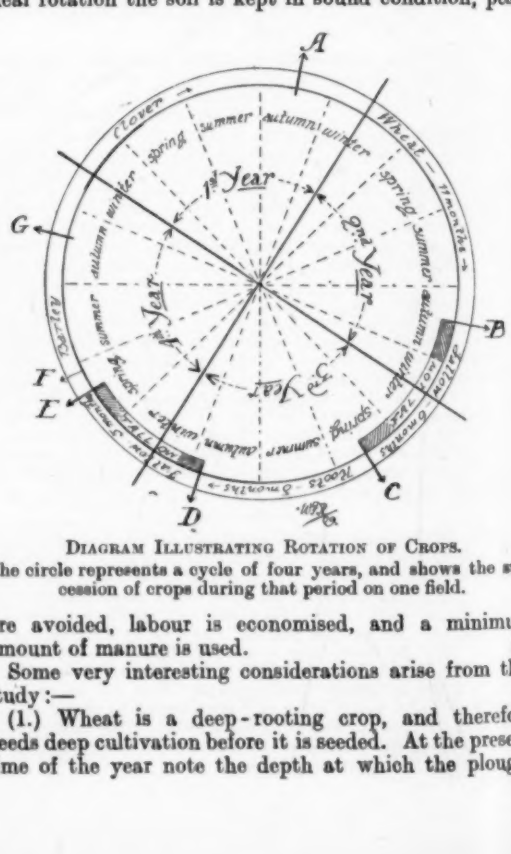


Diagram Illustrating Rotation of Crops.
The circle represents a cycle of four years, and shows the succession of crops during that period on one field.

are avoided, labour is economised, and a minimum amount of manure is used.

Some very interesting considerations arise from this study :—

(1.) Wheat is a deep-rooting crop, and therefore needs deep cultivation before it is seeded. At the present time of the year note the depth at which the plough-

share is set as compared with that of the spring operation. Wheat is also an exhausting crop, and therefore calls for liberal manuring. Again, it is liable to attacks of wireworm, which in the larval and pupal states remains in the soil for three or four years. Here the importance of a change is emphasised.

2. Roots are a restorative crop, since they are, as in the case of swedes, fed off *in situ* by sheep. The advantage of this operation is great. Roots also leave the soil in a fine state, and therefore little labour is necessary for the preparation of the seed bed for the next crop. Thus rotation economises labour.

3. Barley is not so deep-rooted as wheat. If wheat were to follow roots, deep ploughing, and therefore increased labour, would be necessary.

4. Clover is useless for feeding cattle until its second year of growth. Thus it is sown among barley, in which case the field must be fairly free from weeds. Further, this crop is a member of the Leguminosæ, and therefore its roots are provided with nitrogen nodules. These nodules are inhabited by bacteria which have the power of assimilating nitrogen from the air in the soil. Since these pass eventually into the ground, the nitrogen content of the soil is increased. When a field is clover sick—that is, when clover grown in that field is subject to attacks of eelworm—beans or peas are sown.

Winter Wheat.

A lesson on wheat appeared in the September paper of this series. At this period it is best to devote time to the study of the seed—its form, composition, and mode of germination. Instructive studies result from a comparison of this important plant and barley, since these two cereals have been considered in the preceding lesson on rotations.

1. Obtain a sample of wheat, and examine the grain first with the naked eye and then with a lens. Note convex side, furrow on opposite side, and tufted end.

2. Soak a handful of seed for a few days. Note swollen appearance. Cut longitudinal sections. Note starchy food store—the *endosperm*—and *scutellum*, or the germinating part of the seed. The latter, which contains the embryo, may be easily removed and examined under a lens.

3. Allow several seeds to germinate. Note appearance of radicle and plumule. If possible, develop the plantlet in a culture solution, and observe the mode of rooting. It will be seen that one series of roots arise from the seed and another set a little above it. These are the crown roots, and only develop in the soil when the seed is fairly deeply planted.

4. Take fifty or a hundred seeds. Germinate in a warm room—the optimum temperature for wheat is 89° F. After a few days examine the batch of seeds and count the failures. Calculate the germinating capacity.

5. Carefully examine a market sample of wheat. Remove the impurities — namely, weed seeds. This determines the purity of the sample. The commonest impurities are seeds of wild oats, creeping buttercup, goose-grass, and charlock. Corn-cockle seeds are often found, and as these are about the same size as wheat it is difficult to remove them in the winnowing process.

Notes on Winter Wheat.

The minimum temperature at which wheat will germinate is 41° F.; maximum, 108° F. Observe the influence of weather on germination by the appearance of the leaf.

One bushel of wheat weighs approximately 63 lbs: Two to three bushels are sown per acre. Calculate weights required for fields of which the area is known. Calculate prices from seed catalogues.

Experiments with Soils.

The following simple experiments are suitable for winter work. They may be incorporated in the school gardening correlation scheme.

1. *Action of Water on Soil.*—Select a sample of soil (about 10 grams) and thoroughly mix it with water. Filter. Concentrate the filtrate to show that some substance is dissolved. Refer to action of rain.

2. *Action of Acids on Soil.*—Take the residue from Experiment 1 and heat slowly with dilute HCl. Cool and filter. Concentrate the filtrate to show that some further substance has been dissolved from the soil.

3. *Action of Heat on Soil.*—Weigh an evaporating dish and place in it a sample of soil. Weigh dish and soil, thus determining actual weight of soil used. Heat strongly until the soil assumes a dried appearance. Cool, and again weigh. The difference gives the amount of water driven off. Calculate the percentage of water contained in the soil. Perform the same experiment with clay, chalk, and sand-derived soils. Compare the water-holding powers of these.

4. Weigh a crucible. Place in it from 5 to 7 grams of soil. Weigh again, and determine weight of sample. Heat strongly for some time. Cool, and weigh. Note loss, which represents the organic matter burned away and the moisture driven off. Calculate percentage, and deduct the moisture percentage as determined according to Experiment 3. This gives the percentage of organic matter present approximately. Compare results obtained from a peat soil and sandy soil. Which is the richer in organic matter? Why?

5. Treat several samples of soils with dilute acid. Effervescence denotes the presence of calcium carbonate. Some soils are deficient in this salt, especially those derived from sandstones. The percentage of $CaCO_3$ may be determined by the experiment given in most elementary text-books on chemistry.

6. *Mechanical Division of Soils.*—Select a sample of ordinary garden soil. This should be fairly free from large fragments. Mix thoroughly with water in a beaker. Allow to stand for two minutes. Decant the liquid into another beaker. Agitate, and allow to stand for five minutes. Decant again into another beaker; agitate, and allow to stand for ten minutes. Pour the liquid away. Now compare the settlements obtained in each process with the others. The larger fragments fall first, and each succeeding sediment is finer than the one before it. This is a practical demonstration of what happens in a river or stream. The finer particles travel to the mouth, where the rate of motion is slow; the large fragments are to be found near the source.

7. *Soil Densities.*—Take a fairly large tin—a coffee tin answers the purpose well. Determine its volume by means of a burette or measuring glass. Also find its weight. Then fill with soil lightly, and determine the weight of soil. Thus weight per known volume is easily found. Perform the same operation with several samples of soils. Compare their densities and explain variations in connection with Experiment 6.

After these results have been found, it is possible to determine the weight of soil moved in digging, trenching, and ploughing.

A MODERN MORALITY PLAY.

BY OUR DRAMATIC CRITIC.

THE English stage is nothing if it is not moral, though this is not to be placed to the credit of the Censor. But few playwrights set out seriously to trace the influence of stirring events upon character as does Sir Arthur Conan Doyle in the *Fires of Fate*, which I had the pleasure of seeing at the Lyric Theatre a short time ago.

Colonel Egerton visits Dr. James Roden, and learns that he is afflicted with a mortal disease which will allow him some twelve months of life. The colonel takes the intelligence like the brave man that he is, but after a few moments announces that he intends to hasten his own end rather than become a physical burden to his friends.

The doctor is a professed materialist, but this practical application of his own theory staggers him, and he calls in the aid of his brother, a lovable Nonconformist divine, who persuades the colonel to accompany him and the doctor on a holiday trip up the Nile.

The second act introduces us to the holiday party in a tourist steamer upon the great river. The company is a typical one. We have Miss Sadie Adams of Massachusetts, with her aunt as chaperon; Mr. Cecil Brown of London, a specialist in clubs and *table d'hôte*; Mr. Brodie of Edinburgh, who is keen on the "educational" value of the trip, using the epithet in its narrower sense; and M. Octave Fardet of Paris, the typical Frenchman of the typical play before the *entente cordiale*. Miss Sadie Adams, by the way, is also typical of what we used to think the American girl ought to be like, though I confess that I have never met the type, in spite of a fairly wide acquaintance with Transatlantic ladies.

It is not long before the chief interest centres round the gallant colonel and the young lady from across the water, and the contest between the soldier's sense of honour and his more than ordinary interest in the emphatically romantic maiden is fairly well portrayed. The cynic might say that the girl makes her own feeling for the colonel a little too evident, and the playwright might reply that it takes a good deal of emphasis to make even a small point clear to an ordinary audience.

When the colonel had his painful interview with Dr. Roden, the latter had told him that he knew of only one case similar to his own in which a cure had been effected, and that by means of a shock sustained during a railway collision. The rest of the play is concerned with bringing about the equivalent of a railway accident, and so making the hero free to follow the dictates of his own heart.

The dervishes of the desert become the *diaboli ex machina*, and during a realistic affray Colonel Egerton receives two (if I remember rightly) sounding thwacks upon his cranium, evidently applied on the principle of kill or cure. The medicine works, and the disease is effectually driven out, though to a non-medical spectator the risk of incurring another malady is rather obvious. However, the colonel is now free to offer hand, heart, and his sadly damaged head to the representative of young America—and all ends happily.

The morality of the whole matter is concerned with the effect of danger upon the characters of the chief personages of the drama. Sadie Adams learns more of true womanhood; the colonel plays the man in spite of his sad lack of sword and pistol and a few British Tommies; the minister shows that his religious professions are the outcome of a perfect readiness to act the Christian gentleman under trying circumstances; the doctor sees the folly of his materialism; Mr. Brown learns the littleness of an *entrée* and the futility of a savoury; while M. Fardet plays the reasonable fool in a manner peculiar to the Frenchman of ordinary fiction. More than one of the party come to see death, the last and greatest of all the great sights which this world can afford, and so do not appear at the final reunion, which takes place, as usual, to the sound of shuffling feet and rustling garments. The reverend gentleman, asked why his Master should permit the tragedy, replies in a parable: "The Gardener takes at times both fruit and blossom; the Gardener knows."

There are many fine passages in the play, some of which are rather spoilt by the dramatist's too obvious desire not to bore his audience, and his haste to pull out the comic stop. "Do not be bored," he seems to repeat; "I will make you laugh anon." Consciously or unconsciously, however, he has copied the chief characteristic of the old morality play, where the sublime and the ridiculous were very closely connected indeed.

ANSWERS TO QUESTIONS IN THE OCTOBER SUPPLEMENT.

Section I.

1. $1\frac{1}{32}''$, $2\frac{9}{32}''$, $\frac{1}{2}''$, $5\frac{1}{4}''$, $3\frac{9}{64}''$.
2. $14\frac{1}{2}''$ $19\frac{1}{2}''$ $2\frac{3}{4}''$ $41''$ $25\frac{3}{4}''$
   $10\frac{3}{4}''$ $14\frac{1}{2}''$ $2''$ $30\frac{1}{4}''$ $19\frac{1}{4}''$
   $5\frac{1}{4}''$ $7\frac{1}{4}''$ $1''$ $15\frac{3}{4}''$ $9\frac{3}{4}''$
   $4\frac{7}{10}''$ $5\frac{1}{4}''$ $\frac{1}{2}''$ $12\frac{9}{10}''$ $7\frac{7}{10}''$
   $3\frac{7}{32}''$ $4\frac{3}{8}''$ $\frac{3}{8}''$ $10\frac{1}{4}''$ $6\frac{9}{32}''$
   $1\frac{13}{16}''$ $2\frac{9}{16}''$ $\frac{5}{16}''$ $4\frac{13}{16}''$ $3\frac{9}{16}''$
   $\frac{13}{16}''$ $1\frac{9}{16}''$ $\frac{9}{16}''$ $2\frac{13}{16}''$ $1\frac{13}{16}''$
3. 4″, 3″, $1\frac{1}{2}''$, $\frac{3}{4}''$, 1″, $\frac{13}{32}''$, $\frac{13}{32}''$, 9″.
4. $3\frac{7}{12}'$, $4\frac{3}{4}'$, 9′, $10\frac{1}{4}'$, $6\frac{9}{12}'$.
   $1\frac{7}{36}$, $1\frac{1}{12}$, $\frac{3}{4}$, $3\frac{9}{12}$, $1\frac{9}{36}$ yards.
5. $\frac{3}{4}'' = 1'$.
8. 1″ = 1 mile; r.f. $\frac{1}{63360}$.
9. $\frac{1}{63360}$, $\frac{1}{63360}$, $\frac{1}{63360}$ nearly.
10. £1, 9s. 8d., £1, 3s. 9d.
11. £1, 10s. $0\frac{1}{4}$d.
12. £2, 11s. 0d., $\frac{1}{12}\frac{3}{2}$.
13. This question had better be omitted.
14. £132, £156, £283, 4s. 0d.
15. (*a*) $11\frac{1}{20}$ tons; (*b*) $8\frac{1}{20}$ tons.
18. $14\frac{1}{2}$ weeks nearly.

Section II.

1. 3·58′, 4·83′, ·7′, 10·25′, 6·42′.
   1·19, 1·6, ·2, 3·42, 2·14 yards.
2. Waste on 12′ lengths = 20′ = $\frac{1}{5}$ = ·17 = 17 %.
   „ 18′ „ = 26′ = $\frac{1}{4\frac{3}{4}}$ = ·21 = 21 %.
3. 12s. 6d., 2s. 1d.
4. £2, 2s. 0d.
5. 110 + lbs.
6. $66\frac{2}{3}$ % tin, $33\frac{1}{3}$ % lead. $18\frac{2}{3}$ lbs. tin, $9\frac{1}{3}$ lbs. lead.
7. 91·7 % gold, 8·3 % silver.
8. $3\frac{1}{2}$ lbs. very nearly.
9. £91, 13s. 4d.
10. £2, 10s. 0d. 20·9 % loss.
11. £2, £4, 10s. 0d. Paid for in eleventh month.
12. 40 %. £249, 12s. 0d. per annum.
13. 8·15 %.

(To be continued.)

Our Art and Handwork Section.

PAINTERS AND PICTURES.

BY W. E. SPARKES.

XV.—SIR JOHN GILBERT: A GREAT ILLUSTRATOR.

AN illustrator is born, not made. An artist, trained in exact drawing and brought up on tradition, can often enough succeed in welding together a passable scene from models dressed and posed for the parts; but the models are too obviously innocent of any interest in the moment. How often does one see at a glance the shifts and changes made by the artist before he is satisfied that his lay-figures fit their place on the canvas! And how spiritless the whole result becomes!

Here and there men of genius like Meissonier, infuse life and interest into the wooden countenances of their hired models; but the failures count a heavy percentage among figure-artists as a whole.

The born illustrator is a very different person. From his earliest days his brain teems with pictures; he sees them step into their proper stations, whether he is gazing at an old wall, looking dreamily at the glowing fire, or even at a blank page of paper. He begins to draw as soon as he can hold a pencil. His efforts for many years astonish the family circle, and are checked, as far as possible, by his drawing teacher, who prefers pots and pans elaborately shaded, to the armies of disproportioned knights and lanky fairies with which he is apt to ornament his books. Traddles was a born illustrator, though his genius was restricted to skeletons. But they were a comfort to him, for Dickens puts on record how in Traddles's schoolboy troubles he would issue from them triumphantly, with his hair rebellious as usual, and with a perfect graveyard of skeletons adorning the margins of his books.

For the true illustrator shows his joy in every line. You can read his delight in tracing down these airy shapes that danced so brightly before him. Here are fairies, Pucks, and elves tripping in hundreds about him; glancing in quick-flashing movements, seldom quite still for a moment, though when one here and there is seized by the artist's mind and told to keep the pose for a moment, he will consent to do so under protest, ready at the slightest hint to whirl off again, inextinguishable, among his mad fellows.

CARDINAL WOLSEY ON HIS WAY TO WESTMINSTER HALL.
(From the picture by Sir John Gilbert, R.A., in the Guildhall Art Gallery, London.)

No models could ever take or keep such active poses. Imagine children asked to stand for Mr. Rackham's charming fairies; or for the grumpiest of old persons to compose their features into the settled and uncanny gloom of that artist's crowd who play skittles to the amazement of Rip Van Winkle!

This is not to say that born illustrators have no need of a good training. Indeed, their chief fault has generally been that, contented with catching the gay creatures of their imagination on the wing, they have been

too often careless to draw them in a style to satisfy the trained artist.

An example comes at once to mind. The French have naturally, with their sprightly wits, been seldom wanting in illustrators; and among the most notable was the late Gustave Doré, the illustrator of fairy stories, of Don Quixote, and of the sacred stories. In these he often showed extraordinary imagination, whether in landscape, awful with precipices and waterfalls, or in animated crowds, put together with the utmost skill; while he had a genius for showing emotion both by action and by expression. Yet in spite of his popularity, in spite of his great output (or perhaps by reason of it), French artists refused to acknowledge him as an artist in the proper sense of the word. "An illustrator?" they said, with a shrug. "Oh, certainly. But there is not, to him, the grand line, the academic knowledge. It is all on the surface. It is therefore not heartfelt; it is superficial, conventional, but it is not art."

Observe, they did not object to him as an illustrator, but only as a man who did not build on a solid foundation, laid well and truly on hard, academic study from the life. It does not follow that imagination cannot exist side by side with knowledge. Rembrandt had a stern training. He would come up to the highest standard of those artists who ask for masterly drawing, strong colouring, and, above all, for expression in atmosphere, in light and shade. Yet look through his amazing etchings: crowds in the market-place, beggars, or sick people huddled round the Divine Healer—probably not a single figure drawn directly from the life, yet splendidly strong in drawing, masterly in the way in which every part of every figure (face, stature, and hands) is admirably in keeping, and arranged or composed with every attention to dramatic statement, and to the artistic relationship of one part to all the others.

The "gloomy Republican," as he has been foolishly called, reveals himself as an imaginative man as well as a thoroughly-trained artist—the highest combination, in fact—since without imagination the finest skill results only in the painted hide, and without skill imagination is apt to run riot and distract, from its want of knowledge.

There are degrees in this as in everything else. Occasionally (as with George Morland) the inborn taste helps the artist to select justly; but the chances are greatly against the self-taught man taking a permanently high station.

Sir John Gilbert was largely self-taught. In colour only he took several lessons from the celebrated water-colourist, George Lance. His chief masters were pictures and paintings, from which he made judicious selections. Had his training been at all equal to his imagination, he would probably have taken and maintained a very high station in art; as it is, he has a lively reputation as a remarkable artist—a born illustrator.

Born in 1817 at Greenwich, his father a retired officer who had fought at Waterloo, young John Gilbert passed a pleasant boyhood. Think of it: the days when Sir Walter Scott had put all Europe under his spell; the days when imaginative boys—and all healthy children are imaginative—revelled in his romantic stories, peopled the fields about them with his bygone heroes, and fought over again with Ivanhoe in the lists. And in the Gilbert family there were five boys, all heartily bewitched by Sir Walter, and all adding to one another's joy by fanciful expeditions against robbers or Saracens across the breezy Blackheath and Woolwich Common, or among the ancient trees clustered about Greenwich park. In imagination they picnicked with Robin Hood under the old oaks, or stormed the Observatory (for the time being a mediæval castle) on the hilltop; they watched the Crusaders marching steadily across the uneven and bosky glades of Blackheath towards Palestine; the barges moving slowly with the tide along Greenwich Reach, where the Thames opens out towards the sea, became in their eyes fighting galleys fresh from the attack on some infidel stronghold.

The air was charged with electric romanticism in those days: the slenderest conducting thread of imagination brought it down to earth, flashing and coruscating with untold beauty. It was worth something to be a boy in Sir Walter's day—and to be a boy living near a noble river, an ancient heath, and a park once attached to a palace.

No wonder John Gilbert became known as "the Scott of painting." He was romantic to the fingertips. He could and did draw very many scenes from modern life; but that was for a living. Left to himself, he turned naturally to the Middle Ages, to Shakespeare, to Cervantes, to the great drama of Job. In his old age he presented many of his paintings to various towns. It is curious to read the catalogues—standard-bearers, Shakespearean characters, Don Quixote, Joan of Arc; but only by chance one from actual modern life.

In his youth he had been sent to London as a clerk; but his drawings were seen by the generous Mulready, who advised him to go in for book illustration. A few years later Mr. Ingram established the *Illustrated London News*, a weekly paper, of course illustrated entirely by wood-engravings. Gilbert drew in the first number, and for many years afterwards, notable incidents that occurred during the week. In addition to this he illustrated books, and especially (in 1859) the whole of Shakespeare's plays.

Altogether during his long and busy life he must have drawn nearly 50,000 woodcuts (he drew 30,000 for the *Illustrated London News* alone), and painted 400 pictures in oil and water-colours. He was knighted in 1871, became A.R.A. the same year, and full member of the Academy in 1876. There is thus plenty of material by which to judge him. Thirty years ago his name stood among the highest in British art. Times have changed; yet though he ranks much lower to-day, his skill and imagination as an illustrator still command respect.

"Cardinal Wolsey on His Way to Westminster Hall."

Like Meissonier, who was painting in France during the same years, Sir John Gilbert had no message to deliver. It was the Wardour Street age in British art (at least until 1850)—the age when dress and material counted for much; when most art was anecdotal, or fell back upon Shakespeare for its subjects; when sincerity and strongly-felt emotion gave way before smartness, brilliancy, and superficial success.

They were wonderful hands at a story. They had a kind of instinctive knowledge of how to portray grief, joy, and the noisier emotions. Perhaps there was a little too much play-acting—too much an appeal to the gallery. One might say the humour was obvious, *bourgeois*, "laid on with a trowel." They could manage crowds, too—crowds that played their parts remarkably well—

not pathetic crowds, perhaps, but filling the stage comfortably.

If a man's time should be taken up with hurried work (as John Gilbert's was), with the printer's devil waiting in the hall while the man dashed down the drawing on the boxwood, he could hardly have time to steep himself in his subject; to picture the palpitating hopes and dread fears that would possess the petitioners awaiting the all-powerful Cardinal. That would require anxious thought: the artist must reflect on many things and sympathise with many emotions.

Well, then, if he were not a man of deep sensibility, but one to whom success had come easily, he would be inclined to look upon such a crowd as a picturesque group—not like Rembrandt's crowd of suffering mortals—an assemblage that would come well in a picture. A little shifting and changing, bending a figure here or extending an arm there would lead agreeably to the central figure, the Cardinal, and altogether the picture would be scenic, picturesque, pleasant, but hardly stirring and appealing. In fact, though it might be, as this "Cardinal Wolsey" is, a large painting, it would not contain a tithe of the strong feeling that informs one of William Blake's tiny illustrations to "Job," or Samuel Palmer's small moonlight etchings, or—— But why mention more? It is an illustration pure and simple, an agreeable scene on the stage, with dumb actors. It passes, but no face haunts us after the curtain falls. It is a pageant drawn from Cavendish.

"He would issue out to them," says that old writer, "apparelled all in red, in the habit of a cardinal, with a tippet of sables about his neck, holding in his hand a very fair orange, whereof the meat or substance within was taken out and filled up again with the part of a sponge, wherein was vinegar or other confections against the pestilent airs. Then his gentlemen cried out and said, 'On! my lords and masters; on before! Make way for my lord's grace!'" And so, with his cardinal's hat borne in state before and the silver staff behind him, the scarlet-robed Cardinal passed on his picturesque way.

CRUSADERS ON THE MARCH.
(From the picture by Sir John Gilbert, R.A., in the South Kensington Museum.)

John Gilbert had no liking for repose. Action (that bugbear to so many artists) came to him so naturally. He saw the whole scene at once, with all the actors playing their parts; it would have been an infliction to him to deprive any one of his movement. No doubt this was inborn. But when one looks through a collection of Gilbert's woodcuts, one begins to see, in his large fleshy forms, as well as in his vigorous action, the reflection of that marvellous Flemish painter, Rubens; and one is not surprised to find that when John Gilbert took his few holidays on the Continent he sought out that painter's work in Antwerp and the Louvre—a kindred soul in his love for action and strong colour, but im-

measurably above Gilbert in artistic knowledge of form, in feeling, and, above all, in colour; connected perhaps most closely to the English artist by his swinging lines.

That is one of Gilbert's chief excellences. The line sweeps and turns with suppleness; it is not very subtle, but it comes well in that full drapery he admired so much. You can trace the same swing in the curved arms and bent figures, and in the way in which the different parts of his pictures are connected. This was natural to him, but he had learnt much from Rubens.

In what may be called academical art—searching and satisfactory drawing, as in the hands, the features (especially the eyes)—he was far beneath the great masters. He could be dignified: some of his Shakespearean heroes, from the classic stories particularly, are quite stately in their long robes. He distinguished clearly between the noble and ignoble (in a theatrical sense), though it is to be questioned whether he could have come within measurable distance of the dignity of Rembrandt, Vandyke, or Velasquez—three men who painted an inborn nobility even on rugged faces.

I do not think his fame would be less if all his paintings were lost. It was rather in the small woodcuts—with their sweeping lines, brilliant lights, black depths, and half-lights; with their joy and spring of handling, as though it was a real delight to the artist to see his fancies grow under his hand—that he was most at home and did his strongest work.

The movements came and went, and left him serenely travelling his own gait. Rossetti, Millais, Holman Hunt, and the pre-Raphaelites preached their evangel, but it fell on deaf ears at Greenwich; for, in the height of the movement, Sir John placidly began his most important work—the illustrations to Knight's *Shakespeare*—in which no trace of the new school can be seen: the men of 1860, Pinwell, Houghton, Fred. Walker, developed their serious and splendid art, but Gilbert pursued his own path. He was "a straightforward, simple, direct man" in his nature, and these qualities are reflected in his work. There is no mystery, no striving for more than a spectacular effect, no desire to change with the changing fashions. He was extremely popular, honoured at Court, beloved by his fellow-artists, generous and kindly. He seldom went to outlandish sources for his subjects, and even in his landscapes was thoroughly English in his outlook.

"Crusaders on the March."

And he had a pretty faculty for landscape—for rounded bosky landscape; rough, broken ground; bushes and thick grass; stony streams; for castles peeping among trees; for rolling skies: a romantic setting for romantic deeds. It was remarkable how the influence of British landscape in those days was reflected even in the tiny vignettes that were engraved for headpieces and tailpieces in the books of 1840 to 1860. It seemed as though every artist was proud of the pre-eminence of British landscape painting at home and abroad; even the indifferent draughtsmen filled up their woodcuts with dainty scenes.

The landscape in the "Crusaders" is only a glorified Blackheath. Gilbert had very little time to paint landscape from nature anywhere but among the Kentish hills. But he had a retentive memory; his love for his native heath had fixed its features indelibly on his mind; his wanderings in boyhood had transformed it into any background proper to his imaginings at the moment. Light against dark, shadow against sunlight, deep shades pierced by shafts of light, knots of rounded trees standing on desert plains—in all this Sir John was only carrying out his taste for brilliancy to be reached by contrast; and then with such scenes as background he would fill in an appropriate story.

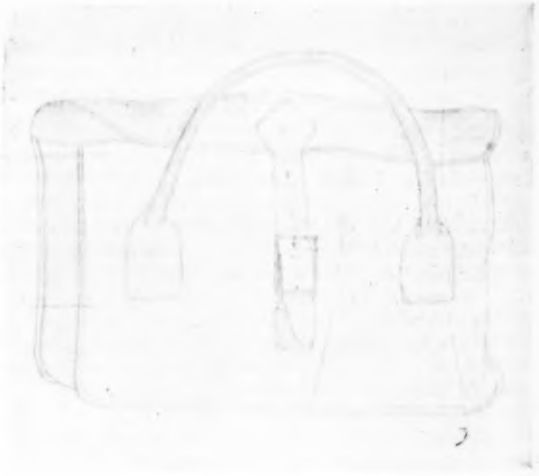
In this picture, the Crusaders march in admirable order, bearing their full armour although not proceeding to battle; they and their horses in no way incommoded by the weight or by the long and weary way. One does not judge the probabilities (though the pre-Raphaelites would have thrown scorn on such a picture); one accepts it for what it is meant to be—a pleasantly-disposed, somewhat theatrical picture, with glittering lights playing on the agreeable armour; with men unwearied, picturesque, marching under a cool sky from which the sun breaks through the clouds to shine on the headlands rolling away into the distance, and the clouds themselves chase each other in cool shadows across the heath.

HONOURS PAGE.

OUR Honours list this month is as follows:—

1. William Holiday (13), Tillmouth Council School.
2. Marjorie Staveley (15), Higher Elementary School, New Brighton.
3. Tom Brown (14), Beith Academy, Ayrshire.
4. Nellie Hawkins (12), National School, Lightcliffe, Yorks.
5. Clarice Scott (13), National School, Lightcliffe, Yorks.
6. T. Marsh (13), Mantle Road Council School, Leicester.

Drawings selected for special commendation were sent by Charles Fox, Sulyard Street School, Lancaster; A. Sellen, Sidney Street Boys' School, Folkestone; William Fisher, Sidney Street Boys' School, Folkestone; Annie M'Guire, Beith Academy, Ayrshire; James Longmuir, Beith Academy, Ayrshire; G. Cawkwell, Wainstalls Council School, Halifax; Annie Maud, Boothferry Road Council School, Goole.



No. 1 in the Honours list was a capital study in colour of a bird, exhibiting the careful drawing which distinguishes the work of this school. No. 2 was a colour study, well drawn, but rather "hard." Nos. 3 and 6 were pencil drawings, the latter showing strong and vigorous handling. Nos. 4 and 5 were very sympathetic studies in colour.

We had expected to receive a great number of outdoor sketches, done during the holidays, but none are to hand yet. There is still time, however, to get some good studies of autumn leaves and fruits. This competition —good as it has been—should reach a much higher level yet, especially as far as the number of drawings sent in is concerned. Drawings must be packed flat, and all studies must be original. No copies, however good, can take "Honours."

PLATE I.

DRAWING IN PUBLIC ELEMENTARY SCHOOLS, DENVER, COLORADO.

BY CHARLES M. CARTER, DIRECTOR.

First and Second Years.

IN the United States the directors of art education in the public schools generally have the greatest liberty in determining their courses of study. There is no central authority which dictates the leading features. Practically every director may arrange the details of a course of study, and put it into immediate practice. Further, if a change is desired, if some new thought presents itself, it may be applied at once—a very different state of affairs from that of our friends in Europe. There some central governing authority must be consulted, and much deliberation precedes changes. This very deliberation, however, acts in some respects as a safeguard.

Considering that we are allowed so much liberty in the United States, it seems somewhat remarkable that there should be such general unanimity in the main features of our course of study. This is probably due in a large degree to the numerous conferences of art teachers. In particular would we mention "The Eastern Drawing Teachers' Association" and "The Western Drawing Teachers' Association." Each has an important annual meeting, followed by complete printed reports. Then, again, the publishers of courses in drawing are very careful in having regard to the trend of development as it manifests itself in the cities and towns doing successful work. Hence it is that there will not be found in various parts of the United States a very great difference in the general character of the work. It might be said that there are fashions in our drawing. A successful development in a particular place is likely to have imitators throughout the country. Therefore, the work in the Denver schools in its main lines will be found quite in accord with the general features of work in other parts of the country, enriched, however, by certain original ideas developed in accordance with local conditions.

The most important factor in determining the subjects and character of the instruction is undoubtedly a consideration of the normal psychological development of child nature. The work of the first two years is eminently introductory, and embraces a consideration of a great variety of subjects relating to the child's environment and interests. Manifestly, great technical skill in expression is not expected. No more perfect expression is required than in other studies.

The mediums employed are various, and embrace chalk, crayons, pencil, charcoal, brush, water-colours, cutting, modelling, etc.—in fact, anything suited to the subject in hand. We find it best to confine ourselves to those mediums which encourage large, bold handling. For colour work we find chalks and crayons particularly adapted to first-year work. The advisability of using water colours in the first and second years' work seems to depend on the knowledge possessed by the teacher. Some remarkably good work has been done with water colours, even in the first year. As for papers, we use a great variety as to texture and colour. They embrace white, tinted, and bogus drawing papers. Some "cover paper" is used for mounting, and booklets.

The illustrations indicate in part the great variety of work. Certain important subjects are not illustrated owing to lack of space.

It should be understood that in all years the subjects are chosen with reference to seasons and notable events. Thus it is that during the autumn and spring months particular attention is paid to nature, as seen in plant and tree forms (Fig. 6, Plate I.). The first snowflakes always give excellent motives for cutting (Fig. 5, Plate I.); while notable events, as the birthday of George Washington, never fail to bring forth illustrations of the story of the cherry-tree; and when "Arbour Day" appears trees demand the greatest attention. Easter and St. Valentine's Day have furnished Figs. 7 and 11, Plate III.

Modelling is generally introduced during the warmer months. This kind of work is considered excellent, as bringing the hand into direct contact with the material of expression. It does not seem to be quite so popular with art teachers as in former times, although in some schools it is used during the entire eight years. In some places where there are local potteries the works have been "fired."

Exercises in paper-folding, cutting, and construction work are highly esteemed (Fig. 11, Plate I.; Figs. 2 and 7, Plate II.; and Figs. 3, 4, 8, and 13, Plate III.). Paper-cutting in particular is very much favoured, as compelling pupils to observe the larger characteristics of forms, omitting details (Fig. 9, Plate II.). This, of course, is an admirable introduction to systematic drawing. Oftentimes the constructive exercises are of such a character as to answer for "busy work."

"Visualisation" is one kind of exercise given. It is really memory work, and consists of placing certain lines, forms, or objects before pupils, studying them for a few minutes, hiding them, and then expressing their appearance by some medium or cutting.

In the second year we gradually lead pupils to observe, and express themselves more carefully. At intervals some of the good old-fashioned plane figures are studied with care (Fig. 8, Plate II.). Incidentally, the referring to form and location is introduced, the idea being for the teacher to seize opportunities for developing the fundamental feature of which she is supposed to have a comprehensive grasp.

Drawing from life is given occasionally (Figs. 4 and 7, Plate II.; Fig. 2, Plate III.). The various occupations, games, etc., are frequently expressed by drawing, painting, or cutting. Some time during the year a circus is quite sure to come to town. It always stimulates the observation of the children, and makes excellent subjects for expression by various means. An interesting result is secured by assigning different parts of the "circus parade" to various pupils, to express by cutting. The results are afterwards pasted together to form a procession.

Colour is developed as occasion offers, particular attention being paid to acquainting pupils with the six elementary colours, so that they may name and judge them correctly.

The teacher is supplied with a printed outline of the main features to be developed. When they embody new ideas, teachers' meetings are held to receive explanations. Further, the teachers have for consultation some of the best drawing books and manuals. They are used only for consultation.

PLATE II.

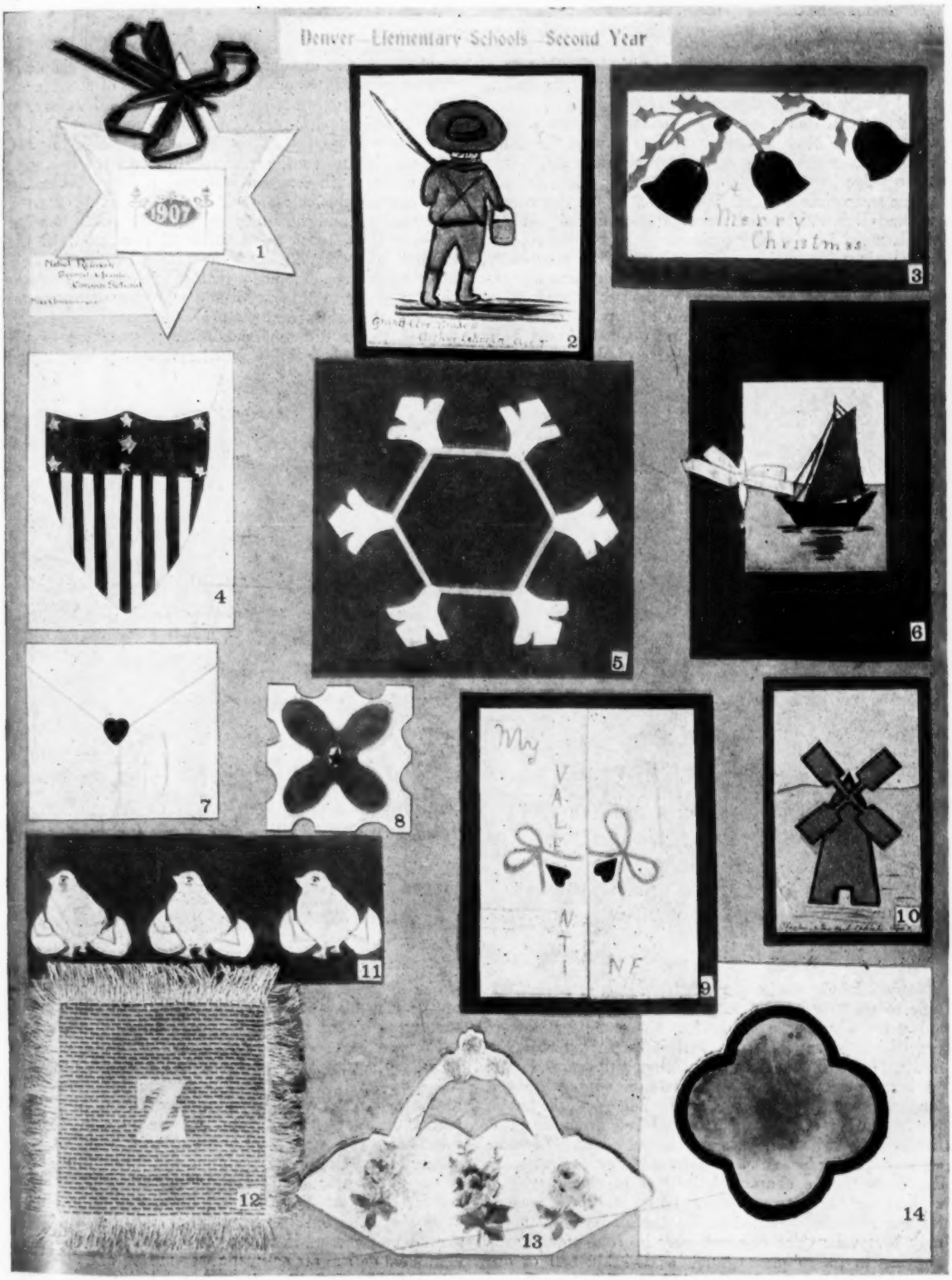

Denver—Elementary Schools—Second Year
1907
1
2
Merry Christmas
3
4
5
6
7
8
My
VALENTINE
9
10
11
12
13
14

PLATE III.

DRAWING AND BOTANY.

BY AGNES E. FARMAN.

OF all sciences, botany is the one that should appeal most to the teacher of drawing; it is one in which his help is directly needed.

In every school the study of flowers forms a large and to the children a most attractive part of the drawing lessons in the spring and summer terms, and it may be so taken as to supplement the botany lessons, and at the same time enhance the interest of the drawing.

The rough and blotted representation of the youngest children, who are chiefly concerned in matching colours, is of little value in this respect; but as they grow older, and learn to observe plants and flowers more closely, their careful pencil drawings of flowers should be of use in the nature lessons. From this point of view it is all-important that the drawing teacher should have a thorough and practical knowledge of the elements of botany. In the study of plant form it is often lamentable to see how a child may sit in front of a flower or spray for a whole lesson, and at the end be unable to describe it or say how one part is connected with another. Sometimes he is not sufficiently interested even to inquire what it is, and a valuable opportunity is missed, not only of helping on the nature work, but of producing better drawing; for children draw far more intelligently when they know the why and wherefore of any particular shape or form. For instance, in dealing with the characteristic lines of the growth of a plant and the pose of a flower on its stalk, the reasons for the attitude assumed or for the shape of a flower may be given. The children may be told how flowers growing in damp places, such as the bluebell of our woods, hang their heads when fully open to protect the pollen; how this necessity for sheltering the pollen from the rain is one important reason for the shapes of flowers generally—for the hanging heads of some large-petalled flowers, such as the daffodil and foxglove, or the sheltering petal-roof of the lupin and monkshood; how some flowers, such as the wood-anemone (Fig. 1), are erect in fine weather and bend down when it is wet; how others with exposed stamens, such as the crocus and convolvulus, close their petals at night or when it is damp, and how the convolvulus folds together again with a twist quite different from that of the original bud (Fig. 2). All such facts require no technical knowledge, but are a matter of common observation to every intelligent person who draws flowers for the love of them, and watches their movements and aspects under different conditions; and they would give an added interest to the drawing lesson, and should be an inducement to the children to make studies of the varying stages of development and the changes undergone by the plants.

FIG. 1.

For the purpose of a better understanding of plant form, the botany and drawing teachers should be ready to co-operate. When leaves, flowers, or seed-vessels are being taken by the former, they should be made a special study by the latter. For example, the attachments of leaves and the different ways in which they spring from or embrace the stem are a lesson in themselves of beautiful lines and forms, and one which is too often neglected. A few are illustrated on page 255. It is not intended to suggest that the drawing lesson should be occupied in making diagrams for the botany. Botanical details are scientific statements, and deal with the structure and the adaptation of form to function, and for this the drawing must be diagrammatic. The

absolute diagram work, and the sections of a flower hardly concern the drawing teacher; but it is his business to see that the pupils know what a plan and section are, and understand what may be called the plan of a flower—that is, the view looking directly into the centre.

The floral diagram is not so much the appearance of the flower when pressed flat as the method of arrangement of the parts when looked at from above. Let the

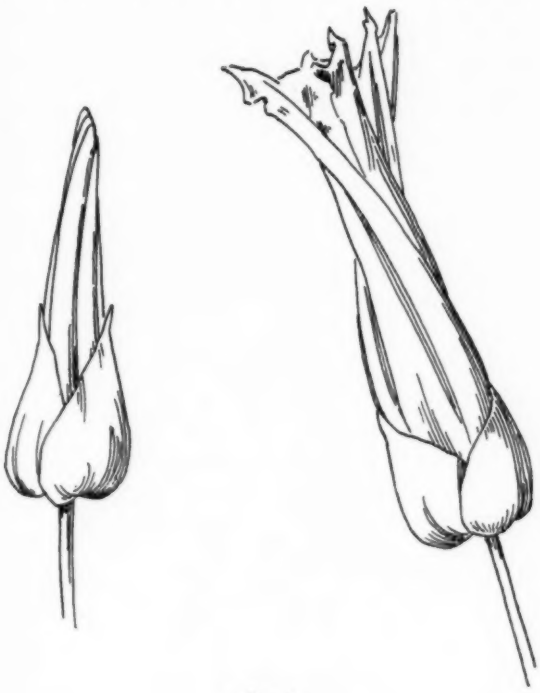


Fig. 2.

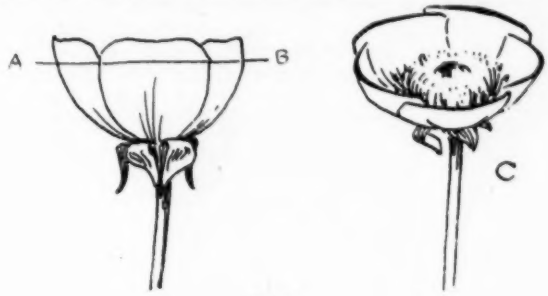


Fig. 3.

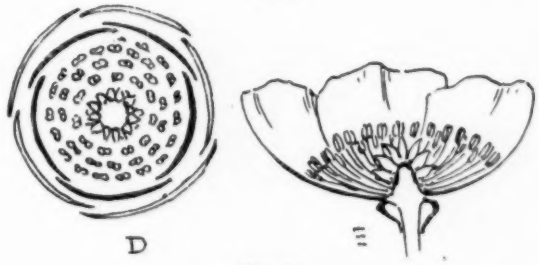


Fig. 3a.

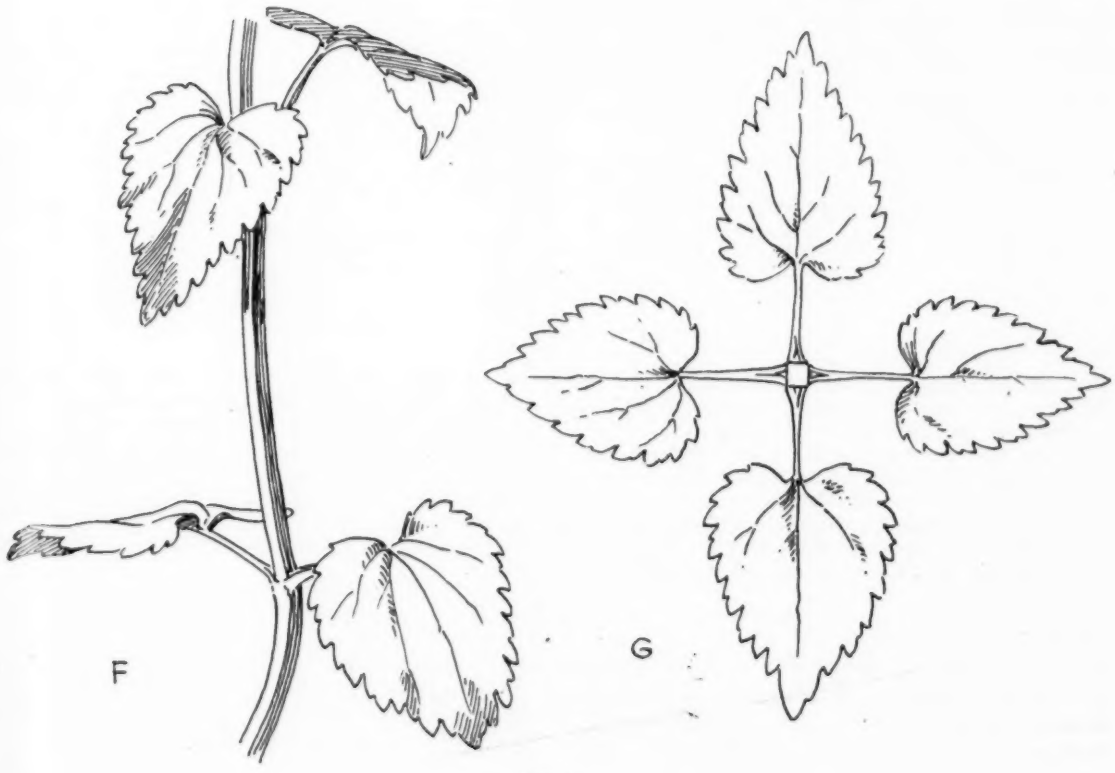


Fig. 4.

petals of a buttercup (Fig. 3) be cut through on the line AB, and they will appear as at C. This, viewed from above, shows the cut edges of the petals in lines and the stamens in little dots, as at D. The outer lines indicate the way in which the sepals enclosed the petals when in the bud. This is the floral diagram. The section is the flower cut through its length to show the position of its parts longitudinally, as at E. It should be understood that for these drawings the flowers must be looked at very closely and at the eye-level, and small flowers must be considerably enlarged.

Again, leaf growth may be represented by a diagram. In Fig. 4 the opposite arrangement of leaves, first in one direction and then in the other, if looked at from above would be shown as at G, whereas there is a considerable length of stalk between the pairs, as is seen at F. Fig. 5 in the same way shows a spiral growth. The plan illustrated is of the actual growth, with the stem slightly twisted, not of the order of leaf development.

While the detailed study of plant form is essential for the children during their drawing course as an excellent discipline in observation and accuracy, and may be taken in such a way as to be helpful in their botany lessons, there is another side of plant study which must not be forgotten—and which is, after all, the one in which the drawing teacher is chiefly concerned—that is the representation of the beauty and harmony of colour, the beauty of curvature, the masses of spray or branch, the light and shade or the foreshortening of parts; and the study of detail for him is not so much an end in itself as the means of revealing the magical beauty and perfection of plant life as a whole.

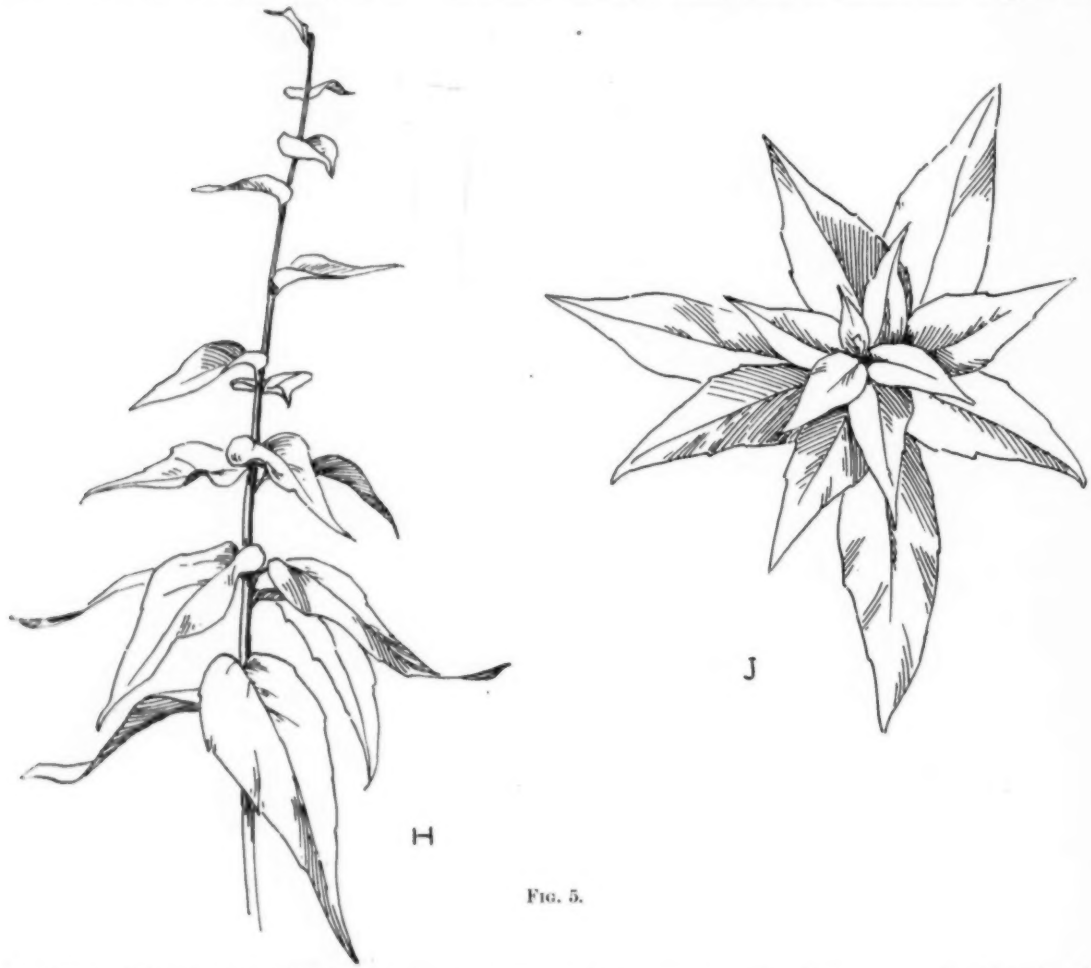


Fig. 5.

"Effects" that are worth anything can only come after years of practice in good, honest, painstaking faithful drawing. We do children an injustice when we lead them to think otherwise. Blurred flower masses, blotesque landscapes, broad-gray-line-and-bogus-paper-big-things, are what Carlyle would call phantasmagoria and simulacra. Let us learn to DRAW.—Henry J. Bailey *in the "School Arts Book."*

CARDBOARD MODELLING.

BY FELIX T. KINGSTON, BARRY.

THE present stage is intended for children of the fifth standard who have worked through the previous stages.

Most of the added difficulties are connected with the cutting of covering papers to size, and the use of adhesives.

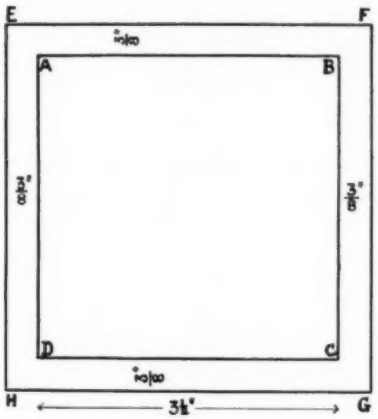


FIG. 1*a*.

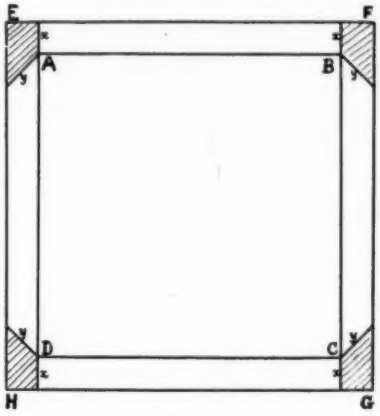


FIG. 1*b*.

It may be remarked at the outset that the exercises which follow are meant to be suggestive rather than to be taken simply as set. The teacher should vary the models in size and form, or adapt them to suit purposes other than those specified. Full use should be made of current geometry in constructing the figures, and scale drawing of earlier standards should receive attention,

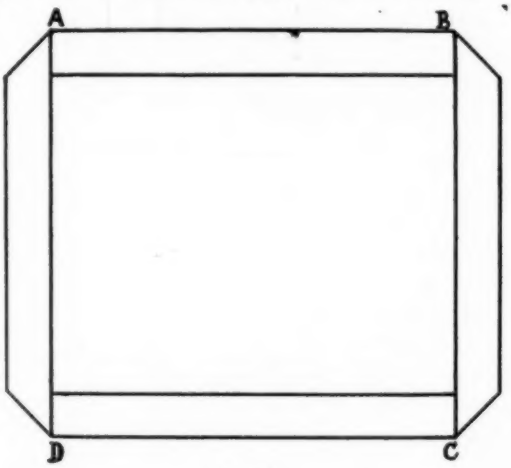


FIG. 1*c*.

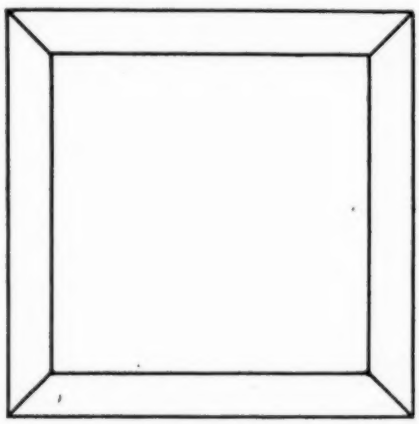


FIG. 1*d*.

while the dimensions ought occasionally to involve the use of the metric system. In all cases the pupils should be encouraged to work with the minimum of help from the teacher, in order that resourcefulness, initiative, and self-dependence may be aroused and strengthened, for manual work lends itself specially to promoting the growth of these qualities. When convenient, pupils may be allowed to complete models at home. This will provide them with educative employment for idle hours; and while keeping hands perhaps out of mischief, it may stimulate the child to adopt some form of manual work as a recreative hobby.

In addition to the materials used in the preceding stages, the following will be required :—

1. Cardboard—the variety known as medium pulpboard. Price 1½d. per imperial sheet.

2. Covering papers for ornamentation of models. In this case purchase both plain-tinted and fancy-coloured papers, such as are often seen pasted on the inside of covers of books; all to be ungummed. These papers are sold at prices ranging from 9d. to 2s. 6d. per dozen sheets. It is better not to make up an order until after an examination of actual specimens.

3. Adhesives for gumming the backs of covering papers. "Gloy" and "stickphast" are better than ordinary gum. Boiled flour or starch will answer equally well: 1 oz. flour to 1 pint water, adding ½ oz. alum to preserve it, and a little oil of cloves to neutralise the somewhat sickly odour which such pastes usually emit.

Seccotine is too stiff for this work, but will be used as before for gluing flaps.

4. Strips of calico or linen $\frac{3}{4}''$ wide will be necessary for fixing models where the use of flaps is impossible. 100 will be ample; price, 6d.

5. Cloth, gummed. This is usually about 1 yard in width, and of various colours. 1 yard will be sufficient; price, 1s. Choose a neutral tint.

6. Steel rules are indispensable at this stage of cardboard modelling. If not already obtained for work of earlier standards, get foot-rules marked inches and cms.; price, 1s.

7. Metal set-squares are also indispensable to secure the requisite degree of accuracy in drawing. Get brass, 60°, 9"; price, 1s.

Knives, scissors, cutting-boards, cloth binding-strips will be required as before; as also HH pencils, kept well pointed.

With the exception of knives, scissors, and cutting-boards, enough material (inclusive of the heavy items of metal rules and set-squares) to work this course with a class of thirty can be purchased for about four guineas.

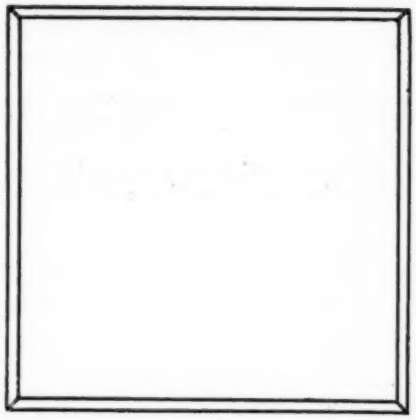


Fig. 1c.—Showing piece of covering paper fixed on the back to complete the mat.

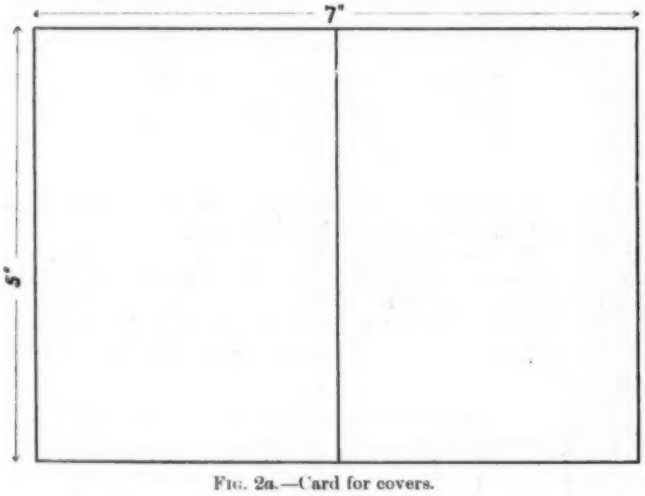


Fig. 2a.—Card for covers.

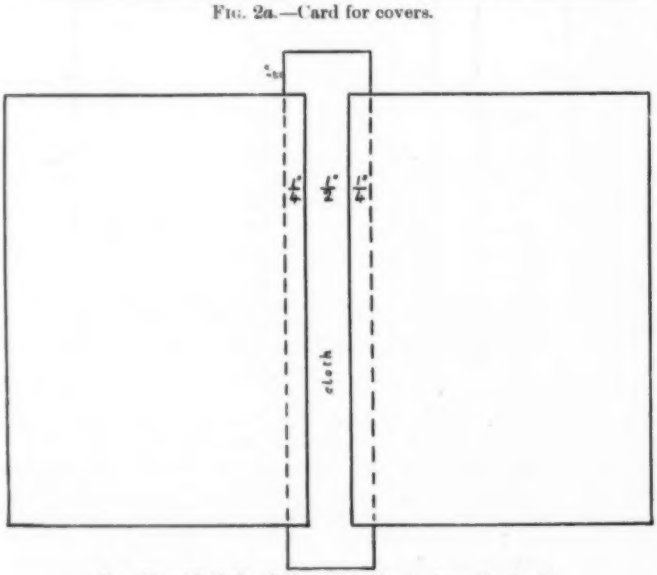


Fig. 2b.—Cloth fixed along exterior to form the back.

Model No. 1.—A Mat.

Any form may be chosen—square, rectangle, rhombus, polygon. The first is here selected for simplicity of illustrating the process of covering it.

Having drawn and cut it out, proceed to cover it thus. Take a piece of covering paper, and draw on the back of it a square whose edge is $\frac{3}{4}''$ longer than the edge of the card. Gum the back of the paper and lay the card on the gummed surface, allowing $\frac{3}{8}''$ of paper to show all round. (See Fig. 1*a*, where ABCD represents the card laid on the covering paper EFGH.) Take the model in the left hand, and slit the margins with scissors at x (Fig. 1*b*) in line with AD, BC, and cut away the waste (shaded) as shown. The line y is cut at such an angle to AB (135° in this case) as will ensure its lying exactly on the diagonal of the square when folded over. Fold the covering paper over the edges AB, CD (see Fig. 1*c*), and then over the remaining edges (Fig. 1*d*). Cover the other side of the mat with paper of a different colour, up to $\frac{1}{16}''$ or less of the edge (Fig. 1*e*).

The foregoing directions presuppose that the pupil has been taught how to apply adhesive. This is the usual method: Having cut the paper to size, lay it face downwards on a larger piece of waste paper, say old exercise books or newspaper. Place one finger of the left hand on the near edge of the paper to keep it from slipping, and lightly but firmly apply the paste, always brushing in *one* direction—*away from* the body, not to and fro. Considerably more than one-half of the surface is now gummed. Next place the finger on the gummed surface, and apply adhesive to the remainder, still brushing in one direction—*towards* the body.

Done in this way, there need be no large amount of gluey matter applied indiscriminately either to the fingers or to the under side of the covering paper. This operation needs to be performed somewhat rapidly, be-

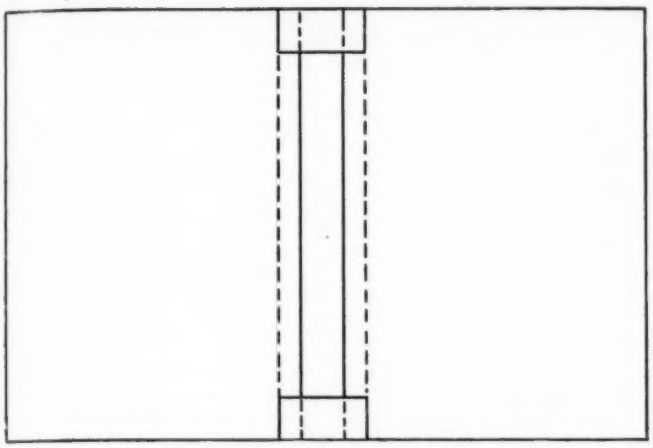


FIG. 2c.—Ends of cloth folded over, and fixed on inside.

covers, in this case 5″ × 7″ (Fig. 2*a*). Divide it into two equal parts, and test the halves by superimposing one on the other. Cut out a strip of cloth 6″ × 1″. Moisten the back of it, and lay the covers on it as shown (Fig. 2*b*). Fold the projecting ends of the cloth (Fig. 2*c*). Now cut out a piece of cloth $4\frac{3}{4}$″ × 1″, and fix along the inside of the back (Fig. 2*d*).

The covers are now ready for ornamentation with fancy paper. The process is similar to that prescribed for the previous model. Cover the exterior first, with pieces of paper $5\frac{3}{4}$″ × $3\frac{3}{4}$″, large enough for allowing $\frac{3}{8}$″ margin to fold over the edges of the cover while overlapping $\frac{1}{8}$″ of cloth. Choose a paper of different colour for the interior. The various steps are illustrated in Fig. 2*e*.

An elastic band can be fitted over the back, or on one cover, to make the model more serviceable, and the back may be stiff-

cause the paper tends to curl directly it begins to absorb moisture. The less adhesive used the better, provided it is applied evenly and thoroughly to the whole surface; where used in excess, it exudes on folding, and is sure to result in dirty work. Cleanliness of person and careful handling are essential to the process; objects accurately made, but exhibiting finger impressions or spots of gum should be consistently condemned. For wiping the fingers where impossible to avoid touching the sticky surface, each pupil should provide himself with a clean duster.

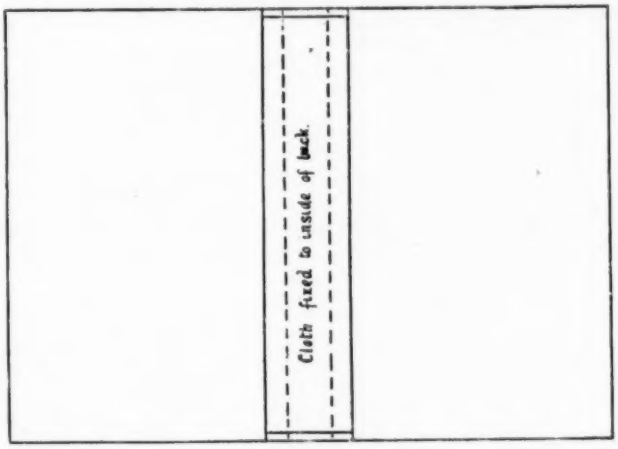


FIG. 2d.

MODEL NO. 2.—A PORTFOLIO.

This may be made to suit any purpose: for example, 5″ × $3\frac{1}{2}$″ forming a notebook-cover, or with pieces of flannel inserted as "leaves" to form a needle-case; $7\frac{1}{2}$″ × 5″ forming a case for notepaper, or of suitable dimensions to serve as a movable cover for reading-book; and so on.

Cut out a piece of card large enough for both

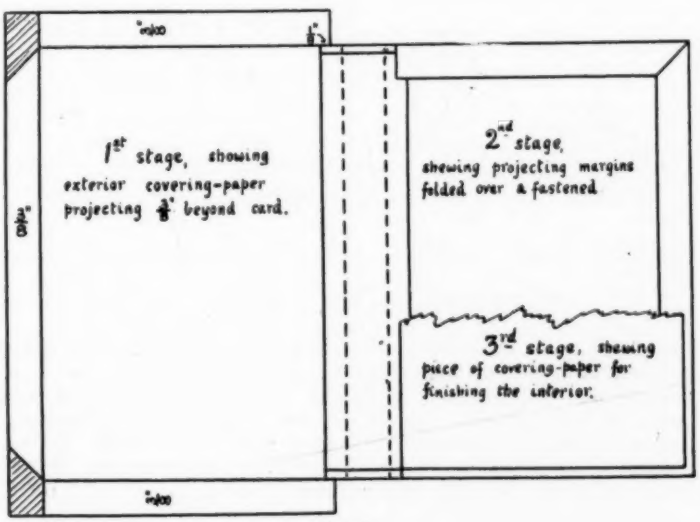

1st stage, showing exterior covering-paper projecting ⅜" beyond card.
2nd stage, shewing projecting margins folded over & fastened.
3rd stage, shewing piece of covering-paper for finishing the interior.

FIG. 2e.

ened by placing a narrow strip of thin card $\frac{1}{4}''$ wide between the strips of cloth.

Model No. 3.—A Rectangular Prism.

This exercise may suitably take the form of measuring and constructing the model of a brick to half-scale. Fig. 3*a* supplies the necessary particulars. Given the scale, the pupils will be able from previous experience to dispense with the aid of the teacher in measuring, planning the drawing, cutting, scoring, and fixing.

As this is a purely geometrical model, and not in any way a useful article, choose for preference a plain covering paper. Cut out a piece $5\frac{1}{4}'' \times 6\frac{1}{4}''$, which will be large enough to cover three of the long faces, and allow $\frac{3}{8}''$ to overlap the remaining three (Fig. 3*b*). When this piece has been firmly fixed, fold over the projecting margins, thus: with scissors slit the paper at *a*, *b*, *c*, *d*; fold and fasten the bits at *a*, *d*, and then the piece *bc* (Fig. 3c). Next, mitre and fix the remaining pieces (3*d*).

A piece of paper $5\frac{1}{4}''$ long, and just under $2\frac{1}{4}''$ wide, will cover the remaining long face, and overlap the ends $\frac{3}{8}''$, while pieces a shade less than $2\frac{1}{4}'' \times 1\frac{1}{2}''$ will cover the ends.

A similar method of covering the models will be adopted in all subsequent cases—the piece of paper first used being cut large enough to allow a margin of about $\frac{3}{8}''$ round the side or sides for which it is intended.

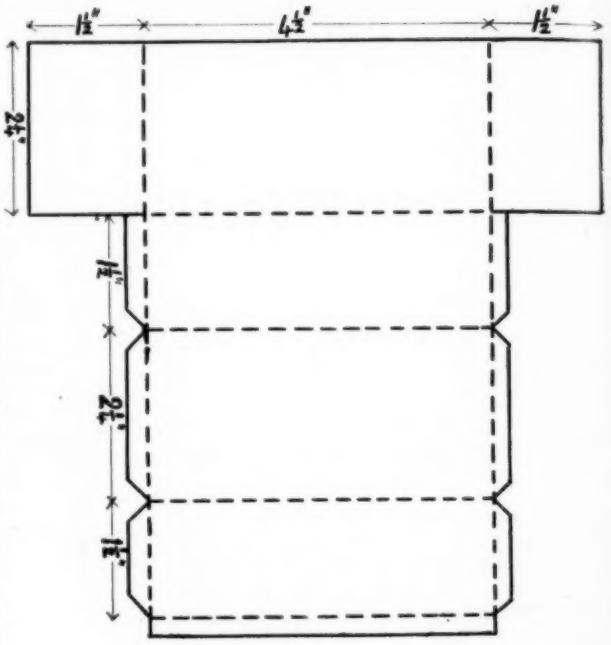


Fig. 3*a*.

When a sufficient number of these models has been made, the scholars may be led to see by building up with their models a solid equal in bulk to the brick, that the latter is *eight* times the volume, though its corresponding edges are only *twice* as long—an experimental verification of the rule that volumes of similar solids are in proportion to the cubes of their edges.

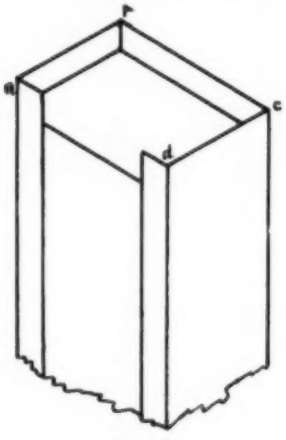


Fig. 3*b*.

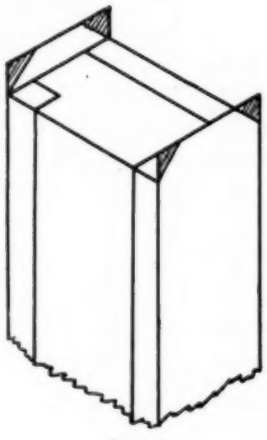


Fig. 3*c*.

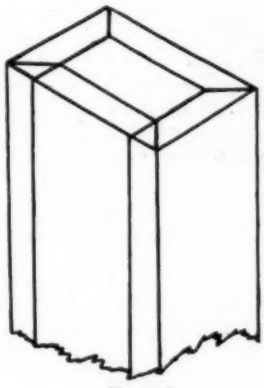


Fig. 3*d*.

EDITORIAL NOTE.

We give the first article of the series on drawing in Denver. These may be taken as typical of American work generally. The scheme for the first two years (children from six to eight or nine years of age) is dealt with. The illustrations show a wider range of work than we are accustomed to here, with a stronger leaning to the "constructive" side. On the other hand, there is not that "honest, painstaking drawing" which Mr. Bailey pleads for in the current number of the excellent *School Arts Book*, and which is usually evident in English work from children of nine and ten years of age. However, the articles will give plenty of food for thought, and will offer abundant suggestions.

NOTES AND SUGGESTIONS ON THE TEACHING OF EXPERIMENTAL SCIENCE, MATHEMATICS, AND DRAWING.

BY C. HAMILTON.

(*Continued from page 207.*)

Section XVIII.

SO far the students have measured or calculated the volume of regular solids, and have calculated the weight when the weight of unit volume has been given to them. The aim, arising out of Section IX., is to determine density in those cases in which we cannot easily weigh a solid of definite and measurable shape.

Recall calculations on weight and volume. Ask what is meant by density, or explain the term. (It ought to be axiomatic that a pound of feathers takes up more space than a pound of lead.) Inquire from the class how liquids are measured, and exhibit for their examination a graduated measuring jar and other vessels used for a similar purpose. It is not necessary to spend time in sketching things like this at first. A sketch of such an object must represent function, or it is of no value, and function is only learned by use. Explain the graduations by immersing regular solids of known volume in water in the measuring jar—wooden cubes or prisms stuck on a darning-needle as a handle will do.

Let the class estimate the volume of irregular solids, and then find the real volume by immersion. The solids should then be weighed and the density calculated. Pieces of stone and metal are the most suitable objects to use for two reasons. The first of these is that the object may be chosen from the natural environment of the student—something in which he has an inherent interest. The second reason lies in the variety of shape that can be secured. When students have to reason about things and draw conclusions, they select from the presented features those which are common and reject those which exhibit variation. Consequently clearness and rapidity of reasoning are secured by arranging the experiments in such a way that unessential features vary as much as possible.

Brass weights are unsuitable. It is unfair to the weight, and the regularity of shape and specific purpose both tend to obscure the aim of the experiment. In these circumstances a dull youngster will probably imagine that he is determining the volume of 10 gms., or something of the sort.

The class should now weigh definite volumes of liquids and calculate the density. There is very little to be gained by making the discovery of the weight of 1 c.c. of water one of the exercises. The students' conception of a fine piece of experimental work is liable to be wholly spoiled by the so-called verification of physical laws and quantities. It is far more honest to stick to the function of experiment described in Article II., and to accept exact values on the authority of the teacher or text-book. There are some things that the class can understand quite as well without as with an experiment, and in such cases an experiment is a waste of time. To the teacher who meets this statement with the contention that experiments serve to keep up the interest we would reply that intellectual progress is a far more effective stimulus. The test of experimental teaching is not shown by the avidity with which students go to the laboratory, but by the keenness with which they work out their results and look forward to the theoretical discussion.

The attention of the class may be called to the fact that some bodies sink and others float or are buoyed up. This leads to the inquiry as to whether the tendency is present in all cases, even in those in which the immersed body sinks. The class may then be asked to suggest means for finding this out.

The suggestion to weigh an object attached to a spring balance in air and water should be followed up. If some of the objects are selected from those which have been used in former experiments, the students may be encouraged to compare the "buoyant effect" or loss of weight in water with the volume. Such comparisons lead to the statement that the loss of weight in grams is equal to the volume of the object in c.cs., and hence to the weight of the displaced water.

This is the stage at which to show the cylinder and bucket experiment. When this is performed as a lecture experiment, the essential feature—the volume of the water—is not visible to the class. An interesting form of the apparatus, in which the bucket consists of a graduated glass cylinder, possesses the advantages that the water can be more readily seen and its volume more accurately measured. It is made by Messrs. Philip Harris and Co., Birmingham.

It is inadvisable to say anything about the principle of Archimedes until after the class have become familiar with the principle and then heard the story.

While many text-books give admirable definitions of specific gravity, relative density, etc., they destroy the value of their teaching by speaking almost in the same breath of the specific gravity of gases in which air or hydrogen is the standard substance. It is worth some little trouble to elicit definitions of—

(*a*) Density (= weight of unit volume).

(*b*) Relative density (= weight of unit volume of the substance compared with the weight of unit volume of some standard substance taken as unity).

(*c*) Specific gravity (relative density with water as the standard substance).

Examples.

1. A cubic inch of cast-iron weighs ·26 lb. What is its density? Must you state your units?

2. A cubic inch of wrought-iron or steel weighs ·28 lb. What is the density of wrought-iron and steel?

3. What is the weight of cast-iron per cubic foot?

4. What is the weight of wrought-iron and steel per cubic foot?

5. A cubic foot of water weighs 62·5 lbs. What is the specific gravity of cast-iron, wrought-iron, and steel?

6. A cubic inch of copper weighs ·32 lb. What is the weight of a cubic foot, and what is its specific gravity?

7. A cubic inch of brass weighs ·30 lb. What is the weight of a cubic foot, and what is the density?

8. A cubic inch of zinc weighs the same as a cubic inch of cast-iron. What is its density, and the weight of a cubic foot?

9. A cubic inch of lead weighs ·41 lb. What is the weight of a cubic foot, and what is its specific gravity?

10. A cubic foot of sea-water weighs 64 lbs. What is its specific gravity?

11. What would be the weight of 1,000 gallons of sea-water?

12. A common brick is $8\frac{1}{2}'' \times 4\frac{1}{4}'' \times 2\frac{1}{2}''$, and weighs 7 lbs. What is the weight of a rod of brickwork, ignoring the mortar?

13. The weight of sandstone is about 140 lbs. per cubic foot. What is the specific gravity?

14. The specific gravity of a sample of Aberdeen granite is 2·6. What will be the weight per cubic foot and per cubic yard?

15. The specific gravity of a sample of whinstone is 2·72. What is the weight of a cubic foot and a cubic yard?

16. If the specific gravity of concrete with a light aggregate is 2·3, what is the weight of a cubic yard?

17. The specific gravity of white Italian marble is 2·72. What is the weight of a slab 8′ × 18″ × 1½″ ?

18. A cubic foot of oak weighs 58 lbs. Find the weight of a square of oak boards 6″ × 1″.

19. Fir weighs ·32 lb. per cubic foot. Find the weight of 40 planks, each 20′ × 12″ × 1½″.

20. The specific gravity of poplar is ·4. What is the weight of a square of poplar in planks 6″ × 1″ ?

21. A block of wood is placed gently in a tub of water, and the amount which runs over measures 1 pint. What is the weight of the block ?

22. A piece of glass tube is dropped into a vessel quite full of water, and the amount which overflows is 3·3 c.c. What is the volume of the glass tube ?

23. If the glass tube in Question 22 weighs 8·25 gms., what is the density, and what is the specific gravity of the glass ?

24. A pint of olive oil weighs 1·125 lbs. What is its specific gravity ?

25. A sample of petroleum has a specific gravity ·8. What would be the weight in a circular tank 2′ 6″ diameter, and 6 feet high, filled with petroleum ?

26. Twenty-five c.c. of mercury weigh 340 gms. What is its specific gravity ? What would be the weight of 500 c.c. ?

27. Gold has a specific gravity 19·3. What would be the weight of 1·7 c.c. ?

28. A piece of zinc weighed 20·7 gms. in air and 17·7 gms. in water. What was its specific gravity ?

29. A body weighed 128 gms. in air and 114 gms. in water. What was its specific gravity ?

30. A piece of iron weighed 1½ lbs. in air and 1·3 lbs. in water. What was its specific gravity ?

31. The specific gravity of zinc is 6·9, and a piece weighs 45 gms. in air. What will it weigh in water ?

32. A solid has a weight, W, and volume, V. Write a formula to give its density, *d*. Does this give the specific gravity ? Is there any difference between English and metric units in this respect ?

33. Write formula of Question 32 to give W and V respectively.

34. If a solid weighs W in air and *w* in water, write a formula for the upward pressure in this case. What does this represent ?

35. In the formula of Question 34 write the formula for the density *d*.

36. Suppose in Question 34 the weight in air and the density were given, write the formula so that you could calculate *w*, the weight in water.

37. Suppose in the same question the density and the weight in water only were given. Write the formula by which you could calculate the weight in air ?

38. Two liquids of specific gravities 1·5 and 1·2 are mixed in equal proportions by volume, and no change in volume occurs on mixing. What is the specific gravity of the mixture ?

39. A nail weighing 5 gms. is driven into a piece of wood weighing 10 gms. What is the specific gravity of the block if the specific gravity of iron is 7·7, and of the wood ·5 ?

40. Find the specific gravity of milk (specific gravity 1.03) diluted with 10 per cent., 20 per cent., 30 per cent. of water.

Section XIX.

The students have hitherto depended upon their common experiences of the properties of solids and liquids. They should now have these impressions collected, examined, corrected, examined where necessary, and extended.

Attention may be drawn to the fact that while solids have a definite shape, liquids take up the form of the vessel in which they are contained. The nature of the free surface of a liquid should be noted, and the modification that this assumes in a narrow tube or near the margin of the containing vessel. Precautions in measuring the height of a liquid surface should be indicated.

The tendency of a drop of liquid to become spherical may also be noted, and the differences in the curvature of the surfaces of water and mercury in glass tubes is not only of interest but of importance.

Some admirable experiments in surface tension will be found in *Boys' Soap Bubbles* (S.P.C.K.). There is no need at this stage to go deeply into the question, but the formation of a drop on the underside of a horizontal surface is worth study, as it emphasises the importance of a drip-groove on the underside of a wall coping, and in similar situations which will be familiar enough to the building student. It will be appropriate, also, to direct attention to the necessity of avoiding conditions in which capillary leakage can take place in lead flashings, etc., on roofs. The porosity of a brick, tiles, and other building materials may be shown. A brick or tile or piece of stone may be dried, weighed, soaked in water, and weighed again. This property of building materials is generally of far more importance than their specific gravity or tensile strength. Thus slates should be as non-porous as possible, yet the volume of the pores may vary from ·05 per cent. to 6 per cent. of the apparent volume of the slate. Tiles must be either as open and porous as possible, or they must be burnt at a clinkering temperature to make them as dense and non-porous as possible. Testing is usually carried out by drying, soaking, and weighing, as described above. Under these circumstances sandstones may absorb 3 per cent. to 4 per cent. of water by weight; Aberdeen granite, ·1 per cent. to ·2 per cent.; Portland stone, about 7 per cent.; true dolomite, 4½ per cent.; Gault brick, 19 per cent.; Staffordshire bluebrick, 4 per cent.; red brick, machine made, 10 per cent.; ordinary bricks, 15 per cent. to 20 per cent. Absorption of water does not, of course, take place instantaneously, and in giving the result of a test the duration of immersion should be stated. From 24 to 30 hours is a common allowance.

A dry brick may be painted on two sides and two ends and fitted with wooden caps on the top and bottom. If coal-gas is passed through a tube in the lower lid or cap, it may be burnt as it issues from a tube in the upper cap. The gas takes some minutes to pass through.

It may be desirable at this point to indicate the importance of a "damp" course in building, and of ventilating bricks beneath the level of the floors. These points can only receive partial treatment, however, here. The main objection to porosity in building materials is the possibility of the water freezing and expanding within the pores. The whole question will therefore come up for discussion again in connection with heat.

The property possessed by liquids of finding their own level should be explained, and a water-level and spirit-level should be examined by the class.

Some difficulty is frequently met with in connection with the property of exerting force equally in all directions, and it is worth a little extra trouble to make this point clear. The best form of apparatus is illustrated in *A Class-Book of Physics*, by Gregory and Hadley (Macmillan and Co.), just published. Another good form is to be found in *Theoretical and Practical Mechanics and Physics*, by A. H. Mackenzie (Macmillan). The first consists of a glass tube about 1 mm. long and 4 cms. diameter, closed at the bottom with an I.R. stopper and containing water. A long, narrow tube dips into this, and is connected at the upper end with a mercury manometer. If several of the long, narrow tubes with their lower ends bent at various angles could be used, this instrument will show not only that pressure is proportional to the depth (which it is designed to show), but also that the pressure at a given depth is the same in every direction. The instrument cannot, unfortunately, be discussed fully at this stage, because it depends for its action on the elasticity of the enclosed air, and unless the next paragraph has been taken first; otherwise the manometer begs the question of pressure

and depth. The term pressure (force per unit of area) and total pressure should be distinguished.

Arising out of the property of liquids of finding their own level we have the U-tube as an instrument for measuring pressure. This may be used for measuring the pressure of gas from the main.

In mining districts the teacher will naturally exhibit and explain the water-gauge, which is used for measuring the pressure of the air in the roadway of a mine. The colliery manager wishes to know not the pressure but the velocity of the air, and in the absence of any discussion on momentum the students may have some difficulty in seeing that the pressure is directly proportional to this quantity. If, however, they doubt whether a moving mass of air exercises force by reason of its motion, they may set their minds at rest by blowing down one end of their U-tubes.

The whole connection between pressure and depth may be revised by studying a tall cylinder fitted with tubulures at the side and at varying distances from the top. When this is filled with water, the level is the same in all the tubes as in the cylinder. Obviously, the total pressure at the base of each of the tubes is equal to the weight of the column of water in each tube; and if each tube is of the same bore, this is equal to the depth of the base—that is, to the depth below the surface of the water in the cylinder.

The students may now be asked whether the two limbs of a water-gauge need be of the same bore. If answers are not obtained readily, an experimental test should be carried out, and the students then asked to find out by calculation why this is so.

The principle of the hydraulic press may be explained, though it is dealt with more appropriately in connection with pumps.

It is presumed that a good deal of the experimental work in this section will be performed by the teacher. It is unfortunate that Haldat's apparatus is expensive. Nothing is more valuable for making clear the point that the pressure on the base of a containing vessel depends only on the area and the depth of the liquid, and not on the shape of the vessel.

EXAMPLES.

1. A brick may weigh from 7 lbs. to 9 lbs. What is the increase in weight of a 7½ lbs. brick that absorbs 8·5 per cent., of an 8 lb. brick that absorbs 10·4 per cent., and of an 8¾ lbs. brick that absorbs 15 per cent. of water?

2. A piece of sandstone 6″ × 4″ × 3″, weighing 142 lbs. per cubic foot, is immersed in water for 30 hours, and then weighs 6½ lbs. What is the percentage of water absorbed?

3. A piece of dolomitic limestone is found to absorb 7·5 per cent. by weight of water. A piece of true dolomite absorbs 4·62 per cent. by weight of water. Which stone would you suggest weighs the most per cubic foot? Give reasons.

4. A gallon of water weighs 62·5 lbs. approximately. What is the weight of a pint? What would be the weight of a pint of methylated spirit of specific gravity ·85, olive oil of specific gravity ·9, mineral oil of specific gravity ·906, sea-water of specific gravity 1·03, and mercury of specific gravity 13·6?

5. If the above substances are contained in a vessel with a base of 4 square inches in area, what will be the total pressure on the base, and what will be the pressure per square inch?

6. A circular can has a base 8″ diameter and a conical top. It is filled up to the cork with water. The depth from the surface of the water to the bottom of the vessel is 16″. What is the total pressure, and the pressure per square inch on the base?

7. A long tube closed at the bottom is ·5 cm. diameter. It is filled with mercury of density 13·6. What is the total pressure, and the pressure per square cm. on the base?

8. Find the total pressure on the sides and base of a rectangular cistern 6′ × 4′ × 3′ deep, when filled with water.

(To be continued.)

EDWIN OF DEIRA.

HISTORICAL PLAY FOR SCHOOLS IN FOUR SCENES.

BY J. EDWARD PARROTT, M.A., LL.D.,

Author of "Pageant of British History," "Britain Overseas," etc.

(Continued from page 209.)

Scene III.—Chamber in Redwald's Palace.

Red. [*Seated at a table*] All the long night I've wrestled with my soul,
And still I travail in perplexity.
Sure, never man had harder choice to make—
His honour 'gainst his land's undoing.
Help me, ye gods! Shall I forswear my oath,
And, at the cost of this young prince's life,
Preserve my realm; or shall I now defy
Proud Ethelfrith, and trust in ghostly might
To save me from his fierce, consuming wrath?
Shall Edwin live or die?

Enter QUEEN.

Queen. O husband dear,
Thou hast kept vigil all the livelong night.
What ails thee? Art thou sick and suffering?
Or does some secret sorrow banish sleep?
Tell me, dear heart; unburden thy sad mind.
Griefs lose their bitterness when they are told,
And sorrow lightens when it partner takes.

Red. 'Tis nothing, dearest. I must judgment give
Of gravest import ere the sun be high.
Be not alarmed, dear wife. Affairs of state
Have busied me throughout the silent hours;
For kings must wake and strive while subjects sleep,
If subjects' sleep shall undisturbèd be.

Queen. O husband, give me of thy confidence.
This is no common business—that I know.
Something—I know not what—weighs down thy soul.
Come, let me share it—be thy other self.
My woman's wit, perchance, shall see the light
While thy deep reason in the darkness gropes.

Red. I thank thee, dearest, but it must not be.

Enter Thane.

Thane. My lord, the embassy from Ethelfrith
Awaits thy answer.

Red. Hush! speak not so loud.

Queen. The embassy from Ethelfrith? Ah me!
What embassy? From Ethelfrith, say you?
Now, now I know; thy secret is revealed.
This long night's torment well I understand:
Ethelfrith hath threatened war upon thee
Unless thou yield him Edwin. Is't not so?
O Redwald, noble-hearted king, be strong!
See, on my knees I beg. Keep faith, keep faith!
Hold to thine oath! Let no foul, craven fears
Make thee the scorn of gods, the cursed of men.
Shall it be said that Redwald basely sold
The guest he swore to cherish? that he feared
To play the man, because his foe was strong?
O, never! Rather would I see thee dead,
Shrouded in honour, than alive in shame,
False to thy oath, an! traitor to thy friend.
O Redwald, bid thy tempter do his worst,
And, come what may, be worthy of thy sires.
Be true unto thyself; leave to thy son
The glory of a pure, unsullied name.
In after years, O let him proudly say,
Thou wouldst not sell thy honour for thy life.

Red. Dear wife, I thank thee for thy fearless words;
Thou hast my weakness goaded into strength.
Sore tempted have I been—yea, on the verge
Of plunging into everlasting shame.
Once more I am myself. I will defy
The wrath of Ethelfrith; I'll fling his bribes
Back in his teeth; I'll stand as Edwin's friend,
Rooted against the tempest of his ire
As some old oak that lifts its noble head
Undaunted to the rage of every blast.
I thank thee, wife. Thou art a helpmeet true;
My wav'ring resolution thou hast wrought
To adamant. [*Strikes bell. Enter* Hus-carl
[*To Hus-carl.*] Seek out Prince Edwin straight,
And say I fain would converse hold with him.
Hus-carl. He is without, and waits thy pleasure, Sire.
[*Exit Hus-carl. Re-enter, ushering in* EDWIN.
Edwin. King Redwald, thou hast news for me—good news,
Is't not so?
Red. I desire thy presence, prince,
While I my answer give to Ethelfrith.
[*To Hus-carl.*] Go, bid the embassy attend me here.
EDWIN *and* QUEEN *converse. Enter* Embassy.
Red. My lords, I have detained you overlong
At this my court whiles I have pondered well
The message of your king. Let me rehearse
His proffered terms. He bids me Edwin slay,
Or yield him to your fatal custody.
If I consent to be a murderer,
He will reward me with great store of gold;
If I refuse, he threatens instant war.
Now hear my answer. I have sworn an oath
To aid, protect, befriend your master's foe.
Were all Northumbria's hills of beaten gold,
And were they offered here as my reward,
I would not, to possess them, sell my soul.
See here, my lords—I clasp the good right hand
Of this young prince, Deira's rightful king;
I league myself with him, and stop my ears
To every vile suggestion of your lord.
Tell him I brand him coward, traitor, knave,
And long to meet him on the battlefield.
Now get you gone, and faithfully report
Your wasted effort and my stern resolve.
1 Chief. When thou shalt hear Northumbria's battle-cry,
Methinks thou wilt repent in blood and tears
These idle vapourings. We go. Farewell! [*Exit Embassy.*
Ed. Good King, my heart's best thanks are thine for aye.
My loyal thanes will gladly take the field
With Redwald as their ally. May the gods
Smile on our enterprise and steel our arms
To make an end of this usurper's power!
A few short hours ago I dreamed a dream:
A vision from the gods appeared to me
And prophesied a glorious victory.
To battle, then, in good, glad heart we go;
Warriors *must* conquer when inspired so.
Red. [*Drawing his sword*] Well, come what may, in honour's name we fight;
The gods be with us and defend the right!
Curtain.

Scene IV.—Chamber in Redwald's Palace.

QUEEN *and her* Ladies *at their needlework.* Glee-maiden *sings.*
Queen. [*At end of song*] Thy voice is sweet, my child;
But cease thee now.
My heart is ill-attuned to melody.
Through all the pulses of thy song I hear
The din of battle—loud, affrighting cries—
The clash of arms—the groans of stricken men.
O, I grow faint! Ye gods, be on our side;
Uphold the righteous and o'erwhelm the proud.
Shield ye my son and husband; Edwin, too,
Whose cause is theirs. Give speedy victory;
And when the gory fray is at an end
Pluck vengeance from the hearts of mortal foes,
And plant therein a pitying gentleness.
Thus do I pray. Give heed unto my prayer.
Lady. The night clouds 'gin to darken all the sky;
Ere this the battle should be lost and won.
Queen. Hist! Hear I not the clang of horses' hoofs?
News of the battle! Give me strength, ye gods!
Enter RAINER, REDWALD'S SON.
Rainer. [*Embraces his mother*] Rejoice, dear mother! Victory is ours!
Queen. The gods be thanked! Thy father? Is he well?
Rain. Unscathed, and so is Edwin. Even now
In joy they homeward spur their wearied steeds.
Queen. [*To ladies*] Go, bid the warder on the signal-tower
Kindle his beacon. Let its tongues of fire
Proclaim to cot and hall the glad, good news.
Spread ye the banquet, and bedeck yourselves
To greet the victors of this glorious day.
[*To Rainer.*] How went the fight, dear son? O, tell me all.
Rain. Swift marched we to the Mercian border-land,
And on the banks of Idle met the foe.
Scarce had we sighted them when Ethelfrith
His vet'rans launched against us. Fierce their charge
As thunderstorm that bursts upon the fields
Of yellow waving corn, and beats it down
Prone to the earth. So suddenly, the foe
Crashed on us with o'erwhelming might. Ah! then
I feared the end had come and we were lost.
But our main battles closed, and like a rock
That stems th' advancing tide, flung off their charge
In blood-red spray. I saw my father's crest
Rising and falling in the thickest press.
I saw him meet Northumbria's warrior king
In single combat. What a fight was there!
Long, long the issue wavered. Then I saw
My father's axe cleave through the brazen helm
Of Ethelfrith, who fell, to rise no more.
At this the vast Northumbrian host lost heart,
And we, resistless, smote them till they fled.
Foul ran the Idle with the blood of slain,
And red the sod whereon they fought and fell.
Valhalla will be thronged to-day, I ween,
With new-come heroes quaffing Odin's mead.
Sure, never since our sires to Britain came,
At such a cost was such a victory won.
Queen. O son! what horrors thou hast seen! Ah me!
E'en in this glorious hour I needs must think
Of wailing wives and orphans, sorrowing sires,
And mothers weeping for their stricken sons.
O this foul war! when, when shall come the time
That men shall cease to slay their fellow-men,
And bring their quarrels to the judgment-seat
Of gentle reason?
Rain. Mother, dry your eyes,
And meet my father with your sweetest smile.
He comes, and Edwin with him.

Enter REDWALD, EDWIN, Warriors, Ladies, Hus-carls, etc., *with demonstrations of joy.*

Red. Gentle wife,
Give me great joy. The god of victory
Hath smiled upon our arms, and we are safe.
Edwin hath won Deira's realm again,
And Ethelfrith is numbered with the slain.

Queen. Redwald, dear husband, all thy joy is mine.
Proudly I greet thee, noble victor-king;
And with great gladness do I Edwin see,
Restored to all his father's royal state.

[*Redwald and Queen sit together.*

Enter PAULINUS. *Places his hand on* EDWIN'S *head.*

Paul. Knowest thou this sign?

Ed. It is the vision.

Paul. No vision I—a man of flesh and blood,
Meek servant of the only living God,
Ruler of princes, King of mighty kings.
To Him alone thy victory is due.
When thou sat'st grieving in thy loneliness,
Waiting for death to cut the tangled skein
Of hopeless life, I came to thee by night,
Foretelling joyful days about to dawn.
Then didst thou promise, if my words proved true,
To heed, obey, and trust me to the end.
This very day my prophecy fulfils—
Thou hast o'ercome thy fiercest, mightiest foe.
I come not in this hour of victory
To press thee to fulfil thy plighted word;
I come to joy with thee—to bid thee strive
For higher, better, nobler, holier things.
Lo! with prophetic eye I now behold
The future like a writing clear unrolled.
Northumbria's ancient sceptre thou shalt wield,
And to thy sway shall subjects gladly yield.
Firm, just, and equal shall thy rule be found,
And plenty in thy garners shall abound.
So calm and peaceful shall thy kingdom rest,
That mothers with their infants at the breast
Shall travel o'er thy land without alarm.
None daring to molest or do them harm.
And then a change, so mystic and so great,
Shall bless thy heart amidst this peaceful state.
Thy ancient heathen gods, false, cruel, grim,
Thou shalt reject, and turn thyself to Him
Who sent His Son to suffer and to die
That all might win eternal joy on high.
The meek White Christ thou shalt in faith adore,
And this thy land be His for evermore.

Red. And now, good friends, we'll end this joyous day
With feasting, mirth, and tuneful roundelay.
Rejoice, ye Angles, in this victory won.
Let every sire recount it to his son,
And tell how Redwald, trusting in the right,
In gory fray o'erthrew Northumbria's might;
How exiled Edwin came unto his own,
And won at last his freedom and a throne.

[*If desired, the scene can conclude with a triumphal chorus.*]

Curtain.

OUR READERS' COLUMN.

THE Editor regrets the enforced omission of Miss Cunnington's contribution this month, owing to extreme pressure upon space. A highly interesting paper on Milton's poems will be given in the December number.

Mr. Perkins's article on the Senior Curriculum, also crowded out this month, will be given in the next issue.

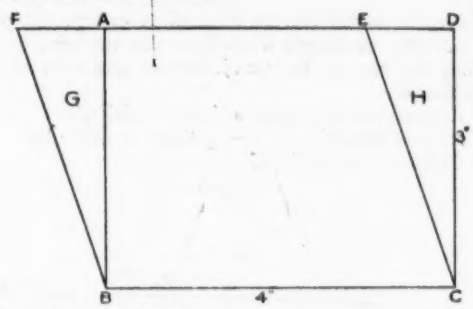
ARITHMETIC *vid* MENSURATION.

BY J. L. MARTIN, ADCROFT SCHOOL, TROWBRIDGE.

AREAS.

I.—THE PARALLELOGRAM.

1. (*a*) Draw a rectangle ABCD having a base of 4 inches and an altitude of 3 inches.



(*b*) Take a point E in AD, and produce DA to F, making AF = DE. Join FB and EC.

The figure BCEF is a parallelogram. Why?

(*c*) On the left the parallelogram overlaps the rectangle by the triangular area marked G, and on the right the rectangle overlaps the parallelogram by the triangular area H.

The figure ABCE belongs to both the rectangle and the parallelogram.

Cut out the figure FBCD.

Cut out the triangle marked G and compare it with triangle H.

How does the area of the rectangle ABCD compare with that of the parallelogram FBCE?

Name the base of each of the parallelograms; the altitude. What is the area of each?

2. (*a*) Cut from paper different shaped parallelograms.

(*b*) Change them to rectangles by cutting off a part similar to G and placing it like H.

How is the area of a rectangle found?

Since any parallelogram may be made into a rectangle of the same base and altitude, how may we find the area of a parallelogram?

3. Find the areas of objects such as tiles, etc., which have faces shaped like parallelograms.

II.—THE TRIANGLE.

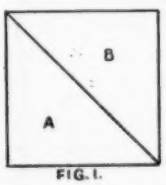


FIG. 1.

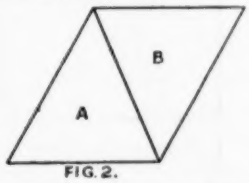


FIG. 2.

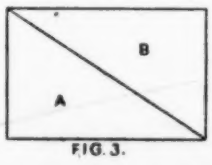


FIG. 3.

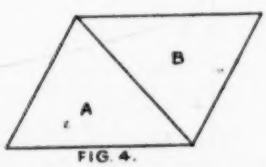


FIG. 4.

1. What kind of figures are those marked 1, 2, 3, and 4?

In each of these how does A compare with B ?

In each of the above figures how do the base of the parallelogram and that of the triangle compare ?

Compare also the altitude of the parallelogram and that of the triangle.

2. Fold a paper once. Cut through both leaves of the paper at the same time so as to form two triangles.

Arrange these two triangles so as to form a parallelogram.

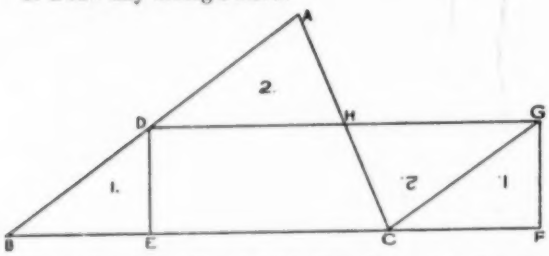
Place the parallelogram on a piece of squared paper and measure the length of its base and altitude.

Find the area of the parallelogram and then that of the triangle.

Area of parallelogram = base × altitude.

Area of triangle = $\frac{1}{2}$ (base × altitude).

3. Draw any triangle ABC.



Bisect the sides AB and AC in D and H. Join D to H.

Make DE perpendicular to BC.

Transpose the triangles to the position shown in the rectangle DEFG.

Compare the areas of the triangle ABC, the rectangle DEFG, and the parallelogram DBCG.

Compare the altitude of the triangle ABC and that of the rectangle DEFG.

4. Find the areas of triangles having the following dimensions :—

Base.	Alt.	Ans.
4 ft. 3 in.	3 ft. 6 in.	7 sq. ft. 770 sq. in.
2 ft. 3 in.	1 ft. 3 in.	1 sq. ft. 715 sq. in.
6 ft. 8 in.	7 ft. 6 in.	25 sq. ft.
3 ft. 7 in.	2 ft. 9 in.	4 sq. ft. 163$\frac{1}{3}$ sq. in.

Area of the Circle.

1. (*a*) Draw on cardboard of uniform thickness and squared two equal squares having sides of 20 units.

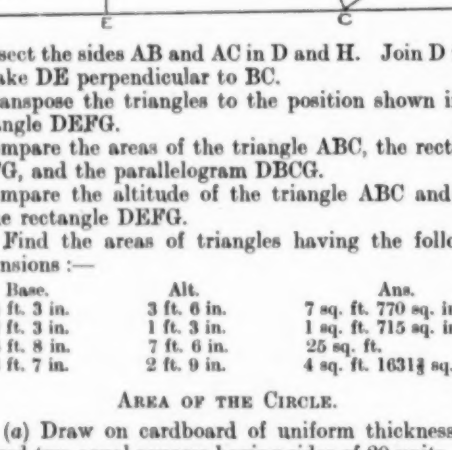


FIG. 1

Inscribe in the first a circle having a radius of 10 units, and draw the square on the radius as indicated.

If r represents the radius of the circle, then r^2, or the square of the radius, equals 100 square units.

Judge how many times the area of the circle is greater than that of the square on the radius.

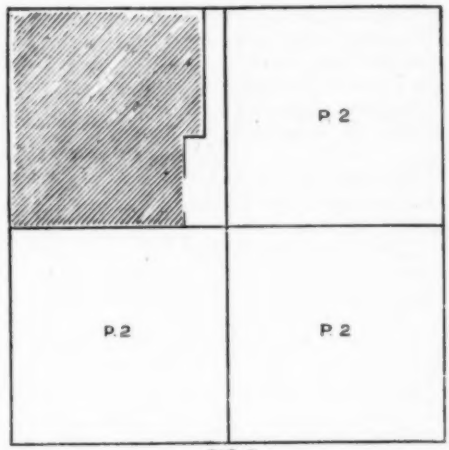


FIG. 2

(*b*) Count the number of squares outside the circle, including those which are more than half a square, but neglecting those which are less than half. How can you find how many units there are in the circle ?

Find correct to the second decimal place how often the square on the radius is contained in the circle.

Area of circle = R^2x ?

Similarly compare the area of the large square and that of the circle.

If D = diameter, then area of circle = D^2x ?

2. Shade the second square so as to show the number of squares contained in the circle.

Carefully cut off the circle (Fig. 1) and the shaded portion (Fig. 2).

The teacher will weigh an equal number of the circles against an equal number of the figures cut out from the second square, and the weights should be found to be approximately equal.

3. (*a*) Find the areas of circles having radii of 4 in., 7 cm., and 11 in.

(*b*) Find the areas of circles which have a diameter of 4 cm., 6 in., and 8 cm.

(*c*) How would you express the area of a circle which has a radius of a inches ? of a circle whose diameter is y ?

Messrs Ginn and Company will shortly publish a *History of English Literature*, by William J. Long. This work is a direct, simple, and interesting account of the great English writers, their works, and the literary periods in which they are included. The sympathetic and scholarly atmosphere pervading the entire work cannot but inspire a love of good literature, and give a better insight into the life and history of our race. This, it has seemed, is a more noble aim than the development of a detailed critical skill, or a second-hand familiarity with literature through what has been written about it. The quotations, outlines, summaries, historical introductions, complete indexes, and a good working bibliography will be found of inestimable value to students. The frontispiece—"The Canterbury Pilgrims," lithographed in nine colours from a direct copy taken from a manuscript in the British Museum—is believed to be the finest illustration ever printed in a text-book. Many other full-page and smaller illustrations are included in the book. Each one has been selected with a regard for its artistic merit as well as for its relation to English literature.

THE REPAIRING OF GARMENTS IN GIRLS' SCHOOLS.

BY J. A. FLEMING.

REPAIRING must be taught systematically to be of any real value. It is not enough to ask a class to "bring mending next sewing day." Such a request may—probably *will*—result in one or two girls bringing articles so unsuitable that the teacher will pronounce the project impossible, and give it up in disgust.

In *every* class in the writer's school three-fourths of the girls at least, when required, bring articles suited to the stage at which they have arrived. The district is a densely populated one, and, while not exactly a slum, is certainly not composed of the better class of artisans.

Patience, tact, and common-sense, combined with systematic lessons, are needed to secure the interest of the pupil and the co-operation of the parent. Suitable garments will, as a rule, be forthcoming when the mothers realise that the teaching has been such as to demand them. At first the teacher must be satisfied with the day of small things. Fear of ridicule is a great deterrent to most children, for girls are apt to giggle when an unsightly object is held up to view. That being so, the teacher should exhibit garments of her own in varying stages of wear for demonstration purposes, until the class has become used to such exhibitions and learns to take them as a matter of course. They may be succeeded by some brought by better-class girls, and followed gradually by even the poorest, the only stipulation being that they are perfectly *clean*, for sanitary reasons. It is necessary that the teacher should have some object in view, and some definite plan by means of which she intends to attain that object.

Demonstration and conversation lessons are most important, and, indeed, an absolutely necessary adjunct to the teaching of repairing. If the girls are allowed to offer suggestions in each of the repairing cases, they will be stimulated to think for themselves; and their answers will reveal such ingenuity and fertility of device, or else erroneous ideas, as will prove illuminating to the teacher.

In the lower classes the teacher will be surprised to find how much mending can be done by a knowledge only of hemming, seaming, and felling. Tablecloths, sheets, the buttons of pinafores, etc., may have the worn hems cut off and be re-hemmed. Longitudinal slits in most garments can be repaired by seaming and felling.

The fastenings of aprons and pinafores will also afford ample scope for talk as well as subsequent practice, as tape strings and loops present many possibilities, while many worn edges and slits can be made neat by a strip of tape hemmed on.

Children who are not advanced enough to work buttonholes can be allowed to affix that very useful substitute, a tape loop, on certain garments, and on others where a band is too short, or where the buttonhole has given way.

The point to be remembered particularly is that some method must be adopted that is suited to the capabilities of the child at her particular stage of progress. It may or may not be superseded by a better plan when she becomes more proficient. It would be as well at the outset, with the older girls, to recount the exercises that have already been taught, so that the conversation may be kept within workable limits, for no patching—or, indeed, any other exercise—should be permitted *that has not been taught in class.*

The fundamental difference between calico and flannel will call for a revision of the methods of fixing and sewing the various materials in general use—calico, print, flannel, and flannelette. These may all be treated differently according to the ability of the pupils, the appearance of the garment, and the extent of the injury. Flannelette, being composed entirely of cotton, is fixed and sewn like calico, excepting the very thick qualities, which may be treated as flannel. The girls, having worked a flannel patch, know that the edges are made neat and firm by herringboning. Thus the following points may be educed: A flannel patch is not turned in at all, a print patch is turned in once, and a calico patch has the first turning folded back to form a fell. A completed print patch shows only a square of seam stitches on the right side, the raw edges on the wrong being made neat by overcasting, which does not show through; a calico patch shows a square of seaming surrounded by the felling stitches; while a flannel patch shows an inner square of herringboning and an outer one of such small stitches as form the top and bottom of the herringboning.

Thus the inference may be drawn that the print patch method will be most suited to plain cotton blouses, dresses, skirts, overalls, as well as garments having a pattern on them, as it is advisable that all outer garments should exhibit as little of the signs of repairing as possible.

(*To be continued.*)

OUTLINES OF A SCHEME OF GEOGRAPHY.

(*With acknowledgments to W. Pullinger, Esq., M.A., Director, Wiltshire Education Committee.*)

Age 7–8.—Informal nature study of the home region.

Tales of other lands.

Age 8–9.—The main facts of physical geography, illustrated by suitable examples from the school district.

The representation (to scale) of the school and its immediate surroundings, leading up to the 25″ map.

Simple observations of movements of sun and stars.

Descriptions of other lands, with greater detail.

Age 9–10.—The human interest of the home region. The social, industrial, and commercial relations of the people of the village, town, and district.

Non-instrumental observation of the weather.

The representation of heights. Introduction to contour lines. Use of map of Wiltshire.

Wiltshire: physical features; trade and industry; connection with local history; down land typical of a large part of S. and S.E. England.

Broad treatment of the British Isles. Simple notions of the relations between the British Isles and rest of world.

Age 10–11.—Instrumental observations of the weather: their representation. (These to be used in making an elementary study of the climate of the home region.)

The British Isles: the separate geographical areas.

Broad treatment of the continents.

Age 11–12.—The representation of the home region by 6″ map. Contours: simple map exercises.

Europe and the Mediterranean area in greater detail. The relations of the British Isles to Europe.

More detailed study of America. The relations of the British Isles to America.

Age 12–13.—The 1″ map of the school district (use *reduced* ordnance map first).

Asia and Africa in greater detail. Relations of British Isles to Asia and Africa.

The main relations of rotation, inclination of axis and revolution. Seasons and climate.

Age 13–14.—More advanced study of the home region.

The elementary geology of the home region: excursions to quarries, gravel-pits, clay-pits, brickworks, the hills. Relation of soils to industry and settlements.

The exact mapping of a part of the school district.

The British Empire, with particular attention to its historical development. The relations of the British Isles to the Colonies.

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Motions of the moon. Simple explanation of the tides.

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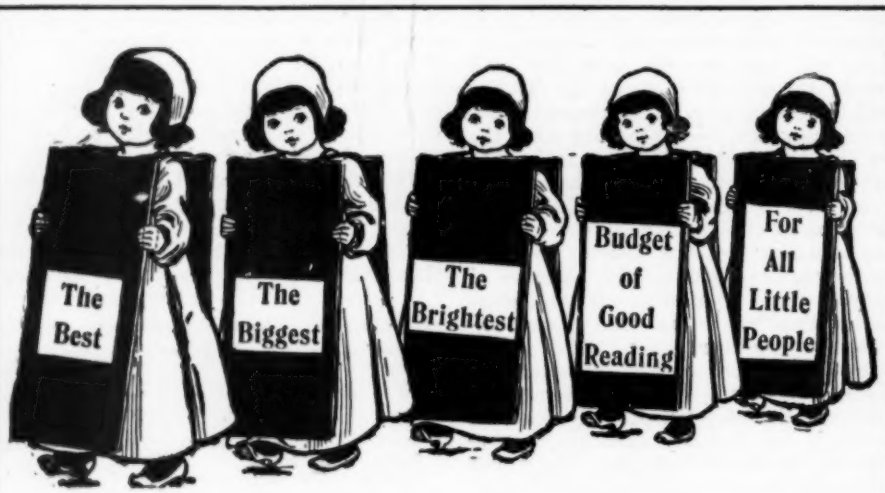

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Words by J. B. SHELLEY. **"AUTUMN."** *Music by* F. H. SQUIRES, F.R.C.O.

SONG.

Andantino con espressione.
p
The warm sun is fall-ing, The bleak wind is wail-ing, The bare boughs are sigh-ing, The pale flow'rs are dy-ing, And the
p
mp
Ped.
cantabile.
rall.
year on the earth her death-bed, In a shroud of leaves, dead is ly-ing. Come,
Ped. * Ped. Ped. * Ped. * Ped. Ped. *
a tempo, non troppo allegro.
months, come a-way, From No-vem-ber to May, From No-vem-ber to May, In your sad-dest ar-
colla voce.
Ped. Ped.
ray, Fol-low the bier of the dead cold year, And like dim shad-ows watch by her sep-ul-
Ped. *
p
cres.
chre. The chill rain is fall-ing, The nipt worm is craw-ling, The riv-ers are swell-ing, The
p
cres. molto.

NOTE.—Mr. Squires has composed four Songs of the Seasons which our readers will doubtless find particularly useful for school entertainments. The Spring, Summer, and Winter Songs will be given in our next number. Those of our readers who are preparing for school concerts will find this cycle of song of real value in the coming season.

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THOMAS NELSON & SONS, 35 Paternoster Row, London, E.C.

SEASONAL LESSONS IN NATURE STUDY.

BY THE REV. ALFRED THORNLEY, M.A., F.L.S., F.E.S., SUPERINTENDENT OF NATURE STUDY TO THE NOTTINGHAMSHIRE AND LEICESTERSHIRE COUNTY COUNCILS.

THE WORK OF THE LEAF.

1. Evaporation of Water (Transpiration).

(*a*) Plants absorb water by their roots. (See lesson on Root, and also lesson on Stem.) Cells become distended (turgid); pressure released by evaporation. Current thus caused known as transpiration current.

Experiment 1.—To show transpiration.

Fuchsia (or other) leaf enclosed in a test tube; the cork is split so as to allow the petiole to pass between: it must, however, fit very tightly. Then the deposition of vapour condensing into drops must be observed. The plant should be well watered (not on the leaves) beforehand, and placed in the sunshine.

The experiment could be made "quantitative" by weighing the test tube and cork beforehand, and again after the experiment is concluded. The amount of water transpired in a given time could then be measured. If the area of the leaf were estimated also, a still better quantitative result could be obtained. This form of the experiment, however, is only suitable for higher standards. (See Fig. 1.)

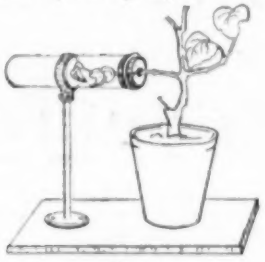


Fig. 1.

Experiment 2.—A very simple and effective experiment is to get two bottles of the same size: place a little water in each; cork up, and bore a hole through each cork. Through the cork of one only, insert a strong shoot cut from a tree. Now suspend the bottles, one from each end of a strong rod, and balance them carefully by a string tied in the middle. It will then be seen how the bottle with the shoot goes up, owing to the much greater loss by transpiration than by evaporation.

(*b*) The transpiration current helps to carry and distribute the soluble food amongst the plant tissues, and to keep the cells turgid.

(*c*) *Where Transpiration takes place.*

In the junior classes the children will have to be told that the water is evaporated (transpired) through myriads of little pores on the under side of the leaf (*stomata*). A prepared slide, or a piece of the epidermis of a leaf stripped from the lower surface and roughly mounted between two pieces of glass, may be shown under the compound microscope. With upper classes the following pretty experiment may be performed.

Experiment 3.—Saturate a piece of filter paper (or blotting-paper) with chloride of cobalt, and then thoroughly dry it. It will turn a bright blue colour. Now allow the paper to stand for some little time in moist air, and it will turn a light pink, the blue colour returning on drying it again. A fresh living leaf is taken, thoroughly dried externally, and placed between folds of the prepared paper. Some little pressure is added by placing the enfolded leaf between glass plates. It must be left for a short time (ten minutes or so), when it will be found that the side of the prepared paper next to the lower surface of the leaf is turning a light rose colour, whereas the side next to the upper surface is scarcely affected. The experiment should be made on a dry day, as the salt is quickly affected by moisture.

Notes.—An intelligent teacher will readily devise numerous experiments, both qualitative and quantitative, to show transpiration. He must try to impress upon the class the great importance of this phenomenon, and the enormous amount of water evaporated by plant agency. Dr. Strasburger tells us that a strong sunflower plant, about the height of a man, transpires on a warm day over a litre of water.

To older classes it must be pointed out that "transpiration" is not purely a physical process like evaporation, but is also a physiological one—the living protoplasm regulating to a large extent the amount of transpiration.

(*d*) *How the Pores* (*Stomata*) *regulate the Evaporation.*

The structure of a *stoma* must be simply explained (see diagram), and the turgidity of the guard cells as

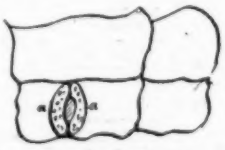


Fig. 2.—A Stoma.
a, *a*, Guard cells: pore, shaded.

effecting the closing or opening of the pore made quite clear. Increased turgidity causes an increase in their length with a diminution in their breadth, thus causing a space or pore to form: with decreasing turgidity the breadth is augmented at the expense of the length, so closing the pore.

2. The Leaves make Food.

This is a large subject, and the teacher must not attempt too much.

The following simple outline is suggested:—

(*a*) The leaves make food. (Contrast with function of roots.)

(*b*) They make food from certain constituents of the air in the first instance.

(*c*) The first visible product of this process is "starch."

Demonstration.

(*a*) A small perennial plant growing in a pot may be stripped of its leaves, and although well watered will finally die.

[It will be better to demonstrate (*c*) before (*b*).]

(*c*) A cold dilute solution of starch must be made, and a solution of iodine in potassium iodide obtained. It must then be shown that the addition of a drop of the iodine to the starch solution causes the immediate appearance of a very beautiful blue colour. A potato may now be cut across, and the section treated with the iodine solution, when it will be seen that wherever the iodine touches it a deep blue stain is produced, due to the presence of starch. Thus it may be shown that iodine is a very delicate test for starch.

A few broad, thin, fresh green leaves must now be

taken, and killed by immersing them in boiling water for a minute. Then they are put into methylated spirit to decolourise them (that is, to dissolve out the green colouring matter or "chlorophyll"). It will require at least a night to do this sufficiently. They are then taken out of the spirit and carefully dried, and then treated with the iodine solution, when the dark blue-black stain produced by the starch in them is easily recognised.

About two days before the above experiment is made, a plant in a pot (fuchsia) is placed in a dark cupboard, and left there for at least forty-eight hours. Then a few leaves are taken from it, killed at once in hot water, decolourised at the same time as those from the first plant, and tested at the same time with the iodine solution. No staining takes place, only a slight brown discoloration. There is no starch in the leaves.

If now this same plant be brought to the light for ten or twelve hours, and its leaves tested in the same way, plentiful starch will be detected.

Inference.—Green plants make starch in the presence of sunlight.

(*b*) *How is the Starch made?*

From the carbonic acid gas present in the atmosphere, in the proportion of about three parts in ten thousand of air. It will not be possible to show every step of the process by which it was demonstrated that the carbon of plants is derived from the carbonic acid of the air, but the two following points can be readily shown:—

1. That green plants will not grow in an atmosphere devoid of carbonic acid gas.

2. The decomposition of the molecule of carbonic acid, and the liberation of oxygen. (See Fig. 3.)

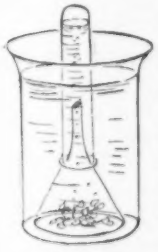


Fig. 3.

To demonstrate 1.—A plant grown in a small pot is put, together with a small vessel containing a strong solution of caustic potash, under a bell glass resting upon a glass plate. The rim is greased so as to prevent the ingress of air. The potash solution absorbs all the CO_2, and the leaves of the plant will be found, when tested by method described in 2 (*c*), to contain no starch.

To demonstrate 2.—The apparatus shown in Fig. 3 is used. A quantity of a true water-plant (Elodea, or water-cress) is put into a glass beaker and covered with a funnel. The whole is covered with water. A test tube is now filled with water and inserted over the neck of the funnel. The apparatus is now placed in bright sunlight. Very soon streams of small bubbles will be seen rising up the neck of the funnel to the top of the test-tube. The water is gradually displaced in the tube, so that in a few hours half or more of the test tube is full of gas. When a considerable quantity has been collected, the tube must be carefully removed by placing the thumb over the mouth without letting in any air. The gas when tested proves to be chiefly oxygen.

Note.—It is assumed that the teacher who undertakes this experiment knows something of chemistry.

This is perhaps as far as the ordinary teacher will be able to go in demonstrating the work of the leaf to the higher classes. A teacher, however, with a knowledge of chemistry should be able to carry the investigation at least one step further, and be able to show *what becomes of the starch at night.* In demonstrating 2 (*c*) it was shown that leaves when in the dark contain no starch, but when brought into the light rapidly make starch. And, conversely, if a plant with its leaves loaded with starch be removed into the dark, the starch rapidly disappears. What becomes of it?

The teacher must obtain from a biological chemist some freshly-made Fehling's solution. This is better purchased, as it is not easy to make well. Squeeze out the juice of a grape into a test tube, add a few drops of Fehling's solution, and boil. A bulky red precipitate is formed. This is due to the precipitation of copper from the solution by the reducing action of the grape sugar in the juice.

Note.—Cane sugar will not give this reaction.

Now, if leaves which have been in the dark some time are macerated in water, and then boiled with Fehling's solution, the presence of grape sugar in them can be readily detected by this method.

To show how the starch is converted into grape sugar, saliva must be added to a solution of starch, which must be kept warm for an hour or so. If after this time Fehling's solution be added to it, and it be gently warmed over a flame, a copious precipitate will be formed, showing the presence of grape sugar. (See Experiment under (*b*) 2.)

The starch has been converted into sugar by the saliva. The substance in the saliva which produces this effect is called a *ferment*, and it is the presence of such *ferments* or *enzymes* in leaves which enables them to effect the change of starch into grape sugar in the dark.

A CORRELATED SCHEME BASED UPON ÆSOP'S FABLES.

"The Cats and the Cheese."

TWO cats stole some cheese. They asked a monkey to decide how it was to be divided. The monkey broke it into two unequal pieces, and weighed them. Then, under pretence of making the pieces equal, he nibbled first one, then the other, till at last there was only a small piece left. The cats begged for this, but the monkey, saying, "The judge must have his fees," ate the last piece. The cats, having themselves stolen the cheese, dared not complain.

Reading.—A. L. Bright Story Readers: Æsop's Fables.

Object Lesson Notes on the Monkey.

Illustrations.—Picture of monkey. Sketch of the hind-foot and fore-paw of monkey. Sketch of monkeys crossing a river.

Aim.—To arouse interest in the life and habits of animals of other lands.

Preparation.—Connect with tale. To whom did the cats go? Why did they choose a monkey? How did the monkey show his cunning?

Presentation.

1. *Habitat of the Monkey.*—By drawing on children's experience of any visit made to a zoological garden, get them to suggest that monkeys are not found wild in this country. Tell children they live in warm countries, and make their home in the woods or among rocks.

2. *Chief Points of Structure.*—(*a*) "*Four Hands.*"—Make children examine sketches of the monkeys' paws, and lead them to

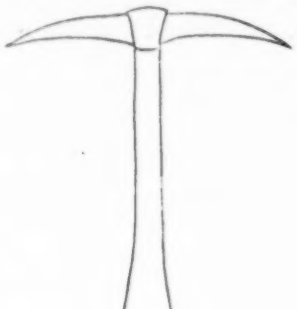
suggest resemblance to human hands. Tell them that monkeys are called "beasts with four hands."

(*b*) *Length of Tail.*—Get the children to suggest this from their own observation of the picture.

(*c*) *Flexibility of Tail.*—Get any child who has seen the monkey-house in any zoological gardens to describe the antics of the monkeys. Dwell on how the monkeys swing from the bar. Show sketch of monkeys crossing a river, and make children note use made of the tail.

3. *Habits.*—(*a*) *Lives in Troops.*—Tell children how the monkeys all keep together in the woods. Show sketch of troop crossing a river, and lead children to see how they help each other. Describe their chattering and playing among the trees.

(*b*) *Feeds on Fruits and Nuts.*—Tell this to children, and lead them to see how monkey's "hands" help it to get its food. Refer again to zoological gardens, and get children to describe a monkey cracking nuts. Lead them to suggest *strength of teeth.*



Freearm Drawing.

(*c*) *Leaps or swings from Tree to Tree or Rock to Rock.*—Describe and show how *length of tail* helps the monkey in balancing its body, and *strength and flexibility of tail* help it in swinging from tree to tree.

(*d*) *Has great Powers of Mimicry.*—Get children to suggest this, and emphasise by some anecdote.

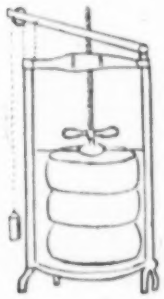
Reading.

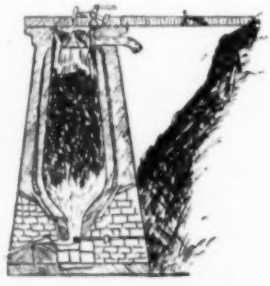
Sound, *ail.* Tail, pail, sail, nail, rail.

One day we went to see the monkeys. One of them got his long tail round a rail. There was a big nail in the rail. The nail hurt his tail, and he fell. There was a pail of water near the rail, and the poor monkey fell into it. A sailor got him out. Just then it began to hail, so we had to run home.

Object Lesson on Cheese.

Illustrations.—A piece of cheese, some milk, some curds, some rennet. Picture of dairy. Sketch of cheese press.





Teacher's Illustrations.

Preparation.—Connect with tale. What did the cats steal? Where was the cheese? When mother wants some cheese where does she get it from? Would you like to learn how cheese is made?

Presentation.—1. Make children examine picture of dairy, and from this examination get them to suggest—

(*a*) *Cheese is made from milk.*

(*b*) *Cheese is made in a dairy.*

2. Make children examine milk and curds. Let them suggest—

(*a*) *Milk is fluid (like water).*

(*b*) *Curd is like jelly.*

Now show the rennet, and tell the children the curd was made by putting some of it into some warm milk. (Put some rennet in a little milk, which should be about 112° F., and let it stand, to show children afterwards.)

3. Let children now compare curds and cheese, and see that the cheese is drier, more solid, than the curds. Show sketch of cheese press, and explain use. Tell children that some colouring matter is added to make the chese yellow.

Reading.

Sound, *ch.* Cheese, chest, chair, chose, church, children.

Two cats were sitting on a chest. They saw some cheese on the table. They jumped from the chest to a chair, and stole the cheese. They chose a monkey to divide the cheese between them. The monkey ate it all himself, and then chased the cats away. The children were at church.

Object Lesson on a Pair of Scales.

Illustrations.—Scales and weights, sand, sugar, cotton wool, sawdust, flour, three or four small paper bags.

Aim.—(*a*) To arouse intelligent interest in everyday events. (*b*) To give elementary concepts of weight and mass.

Preparation.—Connect with fable. How did the monkey try to divide the cheese? Why did he put the two pieces into the scales? Have you ever seen any one using scales? How does the grocer know how much sugar to give you when mother sends you to buy a pound?

Presentation.

Experiment.	*Observation.*
1. Show scales without weight in either.	Pans balance.
2. Place small weight in one pan.	This pan immediately dips.
3. Remove weight.	Pans balance.
4. Place equal weight in each pan.	Pans dip equally.
5. Remove one weight.	Pan rises.
6. Slowly pour in some sand.	Pan dips slowly till both are equal.
7. Remove some sand.	Pan rises a little.
8. Add sand to make pans balance again; remove weight.	Pan from which weight has been removed now rises.
9. Now pour in equal weight of flour.	Pans again balance.
10. Put flour into one bag and sand into another. Compare *size.*	Bag containing sand is smaller than that containing flour.
11. Place a bag in each pan.	Pans balance; small bag of sand balances larger bag of flour. Repeat this experiment using (1) cotton wool, (2) sawdust, (3) sugar.

Reading.

Sound, *air.* Fair, hair, chair, pair.

Tom and Nell were going to the fair. Nell stood on a chair to have her hair curled. Tom had a new pair of boots. At last they were ready, and ran down the stairs to father. When they got to the fair they went to a show, and saw a pair of monkeys. One monkey sat on the rail of a chair. He tried to pull Nell's hair.

Notes on Iron.

First Lesson.

Things required.—Bunsen burner, some tea-lead, a pebble, a bit of chalk, an iron spoon, a tin saucer.

Aim.—To teach effect of heat on metals and minerals.

Experiment.	*Observation.*
1. Put tea-lead, pebble chalk in spoon; hold over burner.	Lead melts, pebble and chalk do not.
2. Pour out some melted lead.	Lead hardens when cold.
3. Pour melted lead into tin saucer. When cold, turn out.	Lead has taken the shape of the saucer.

Second Lesson.

Things required.—Iron ore, pig-iron, objects made of cast iron, picture of blacksmith's forge, sketch of blast-furnace.

Presentation.—1. Let children examine specimen of iron-ore. Tell them some iron is mixed with stone. Give name, *ore.*

2. By reference to *Experiment* 1 in last lesson, children should be led to suggest *process* of smelting. Show sketch of blast-furnace. Describe process, and give name, *smelting.* Show pig-iron.

3. Show specimen of cast-iron (the legs of the desk with maker's name in relief is a good example). By reference to *Experiment* 3 in last lesson, get children to suggest *process of casting.* Describe how the pig-iron is thrown into a huge furnace, and when liquid is run into moulds.

4. Show picture of blacksmith's forge. Describe anvil—use of bellows—making the iron red-hot—hammering it. Tell children anything made by the blacksmith is much stronger than anything made of cast-iron.

Reading.

Sound, *elt.* Felt, melt, smelt, belt, pelt.

It was Jack's birthday. Mother gave him a new belt, and father took him to see his works. When he got into the works he felt very hot. There was such a big fire, and he saw the men put some iron in it. "I did not think," he said, "that iron could melt." His father told him to say smelt, not melt. Just then a rat ran across the yard. Jack tried to pelt it with a stone, but it got away. When he got home he told mother about pelting the rat and seeing the men smelting the iron.

Writing.

Do you see this monkey and the two cats? The cats did not get any of the cheese they stole, for the monkey took it all when they asked him to share it for them.

Brushwork.—Milk-pan; cheese with wedge cut out.
Freearm Drawing.—Miner's pick and shovel.
Modelling.—Scale-pan; wedge of cheese.

BRUSHWORK.

Singing.—"Merry Milkmaids" (Curwen).

Recitations as follows:—

THE HOLIDAY.

A holiday! a holiday! no work the livelong day,
We've only to enjoy ourselves, and run about and play.
A show is coming into town—a bear and camels too,
And a funny little monkey brown,
All dressed in red and blue.
He runs so nimbly up a pole,
And cracks nuts with his teeth,
Then throws the empty broken shells
On the people underneath.
He sits upon his master's arm,
A little drum he beats,
And makes a funny little bow
When offered cakes or sweets.
Oh! come away, then, come away;
The morning's sun is bright,
But somehow on a holiday
It very soon seems night.

THE VILLAGE BLACKSMITH.

Under a spreading chestnut tree
The village smithy stands;
The smith, a mighty man is he,
With large and sinewy hands;
And the muscles of his brawny arms
Are strong as iron bands.

And children coming home from school
Look in at the open door;
They love to see the flaming forge,
And hear the bellows roar,
And catch the burning sparks that fly
Like chaff from a threshing-floor.

THE WISE MEN OF THE EAST. (REDUCED FROM NELSON'S BIBLE WALL PICTURES.)

SCRIPTURE LESSONS FOR YOUNG CHILDREN.

THE STORY OF JESUS—THE INFANT JESUS AND THE SHEPHERDS.

BY MRS. FLORENCE KIRK.

THE teacher should prepare the children for the story before showing the picture. The following introduction suggests one way of arousing an interest.

Introduction.—Do you ever wonder where many of the birds go when summer is over, and the cold winds nip the flowers and blow the leaves off the trees? The flowers and leaves have been busy all the spring and summer making seeds and new buds ready for the next year, and are ready to die; but the birds live for several years, and if God did not tell them to fly away to a land where there is no long, cold winter, but warm, sunny weather all through the year, they would all perish with hunger and cold.

Would you not like to go with them and see that beautiful land? Let us shut our eyes and pretend that we are going there. First we will take a train to the seaside, and then get on a large ship and sail away over the sea for miles and miles and miles. [Open eyes again.]

Have you ever noticed which part of the day is the warmest? It is about twelve o'clock, when the sun is shining almost over our heads. It is not in the same part of the sky as it was when we came to school in the morning. That part is called the east. At noon the sun is in the south. If we followed the birds we should have to go towards the south, and as we sailed along we should find the weather getting warmer and warmer, and the sun would seem to be over our heads nearly all the day.

When we have sailed for three or four weeks (as long as your holiday in the summer) we shall reach another country, not at all like this in many ways. On the trees we should see figs and oranges growing, and grape vines growing up the house walls, laden with bunches of

juicy grapes. [Can you shut your eyes again and see them. Don't you wish you could put out your hands and gather them for yourselves ?] The people living in this country have more than they want for themselves, so they pack the figs and oranges in boxes, and send them over the sea in ships to our country. At Christmas time, when you are eating almonds and raisins and figs and oranges, do you ever wonder where they all grew ? Those nice large juicy oranges, which we call Jaffa oranges, grow in this country, and are sent from a place by the sea called Jaffa. We should not have a Christmas time were it not for a little Boy who lived in this country many, many years ago. Would you like to hear about Him ? Do you think the people living in this country so very different from ours are just like us ? Do they wear the same kind of clothes ? Oh no. A long thin gown is quite enough to keep them warm, and a cloak to wrap themselves in at night. If the sun is very hot, they cover their heads with a long scarf, which they twist round and round, leaving one end to hang down to keep the sun from burning their necks. This is called a turban. [Demonstrate this to the class with a long scarf or towel.]

On their feet they wear either loose slippers, or pieces of leather fastened on the feet by straps wrapped round the ankles, called sandals.

A long time before this little Boy was born a king had come from another country, with a great many soldiers, and made war upon the people and conquered them. So that he would know how many there were, he ordered that their names should be written down, and for this every one had to go to the city where they or their relations first lived.

For this reason a man named Joseph, with Mary his wife, had to go from Nazareth to Bethlehem. When they reached the inn where they were to stay they found it was so crowded that there was no room for them in the house, so the innkeeper turned the horses out of the stable and allowed them to sleep there.

That night God sent them a little baby Boy, and the only bed they could put Him in was the manger, a kind of box fastened to the wall, from which the horses got their food.

This Baby was a wonderful Baby—the most wonderful Baby that ever was sent into the world; but Mary and Joseph did not know this until some people came to see Him early in the morning.

These men were shepherds (a shepherd, you know, is a man who looks after sheep), and that night, while they were tending their sheep on the hills around Bethlehem, they were startled by a bright light which appeared in the sky. They were very much afraid; but soon they heard a voice speaking to them, and, looking up, they saw an angel, who said to them, "Do not be frightened, for I have come to bring you some good news, which will make you and all people very glad. A Baby has been born this day in Bethlehem (where David once lived), who has come to help you all. If you go into the city you will find Him wrapped in swaddling clothes, and lying in a manger." As he finished speaking the shepherds saw a crowd of angels round him, praising God, and singing, "Glory to God in the highest, on earth peace, and goodwill towards men."

When the angels had gone back into heaven, the shepherds said one to another, "Let us go now into Bethlehem, and see this thing which has happened, and which the Lord has told unto us;" so they hurried into the city, and found Mary and Joseph, and the Baby lying in a manger. [Here produce the picture, and get the children to point out the various objects—for example, the Babe and His parents, their dress, etc.; the appearance of the stable, straw on the floor, its use, etc.; the lantern to light up the dark stable; the shepherds, their dress, their attitudes, the shepherd's crook, the leathern water-bottle.]

When the shepherds had seen the Baby they went back to their sheep, telling all the persons they met about the wonderful visit of the angel, and the wonderful and glorious work which the Baby was to perform. All those who heard the story wondered at the strange news, but Mary buried the tidings in her heart, so that she would always remember them.

This Baby was afterwards called Jesus Christ, and every year when His birthday comes people sing songs about Him, and try to be kind and good to one another. One of the songs which has been sung for many years is called a Noël, or Nowell, which means a Christmas song. This is the first verse, which I should like you all to learn by heart:—

"The first Nowell the angel did say
Was to certain poor shepherds in fields where they lay—
In fields where they lay keeping their sheep
On a cold winter's night that was so deep.
They looked up and saw a star
Shining in the East beyond them far;
And to the earth it gave great light.
And so it continued day and night.

Refrain—
Nowell, Nowell, Nowell, Nowell,
Born is the King of Israel."

Other suitable hymns which may well be committed to memory are, "While shepherds watched their flocks by night," "Once in royal David's city," "Hark! the herald angels sing" (one verse), "Christians awake" (revised version, from Novello's *Hymn Book*).

OUR COOKERY COLUMN.

BY ROSAMOND CANDY, FIRST-CLASS DIPLOMÉE, NORTHERN COUNTIES SCHOOL OF COOKERY.

SWEET-MAKING.

IT is only quite recently that the art of sweet-making has been taken up generally by private individuals in this country. Toffee has been the one sweetmeat that most people have made, and even then it has been more by good luck than by knowledge of the subject that the operation has been successful.

Not only children but the grown-ups nowadays have a great taste for sweetmeats, and it is just as well to know how to make such dainties, which, when home-made, are wholesome and unadulterated, besides being much more economical. As in all *good* cooking, there must be no slipshod work. Care, absolute accuracy, and cleanliness, with forethought and taste, must be exercised to ensure success. Besides giving so much pleasure in the home, this branch of cookery might be made very profitable, as there is always a ready market for *home-made* dainties.

The utensils required for sweet-making are very few and simple—for example, a strong enamelled pan, a marble slab or large earthenware meat dish, and a palette knife (or an old pliable knife will answer the same purpose).

The best sugar should *always* be used. Tate's No. 1 cube sugar is always reliable, and is used where *sugar-boiling* is necessary. Where *no cooking* is necessary, use confectioner's icing sugar.

For toffees, caramels, and dark sweets use the best West Indian brown sugar.

Uncooked Varieties.

Cream Walnuts. *Ingredients.*—One pound *icing* sugar, one tablespoonful cold water, one egg, a few drops of vanilla or other flavouring (*fondant*); one pound shelled walnuts. *Method.*—Break the egg gently, and separate yolk from white; place the white in a basin, and add an equal quantity of water; mix these together. Gradually sprinkle in the icing sugar, which should be previously sifted. Make the mixture of such a consistency that it may be formed into balls with your fingers—not too stiff, or the sweets will not be *creamy*. Now mould the mixture into balls not quite so large as a walnut. Take each ball and press on either side half a walnut. When all are finished, set them aside for a few hours to harden.

Coffee Walnut Creams.—These are made in the same way, substituting strong coffee in place of the water. Use chocolate flavouring. A little unsweetened melted chocolate may be added to the *fondant*.

Cherry Creams.—The *fondant* is made in the same way as above. Make into smaller balls about the size of cherry stones. Insert one in each cherry, or cut the cherries in half, and put one half on each side of larger ball of *fondant*, and insert a small piece of angelica for the stems.

Orange Creams.—Make the cream as previously, but flavour with orange juice instead of using water. Add sufficient grated orange rind to colour the *fondant* pale yellow. When thoroughly mixed and smooth, roll out the mixture with a rolling-pin dusted well in sugar. Cut the mixture into lozenges the size of a shilling, using the lid of a tiny box or a vegetable cutter. On top of each cream place a tiny strip of candied orange, and put aside to set and harden.

Lemon Creams may be made in the same way, using a little lemon juice in place of orange.

Almond Creams.—Shell a pound of almonds, or use quarter-pound Jordan almonds. Roll each one in a ball of the *fondant*, and then in a little castor sugar, and put aside to dry. Other nuts may be used in the same way.

Date Creams.—These are made in the same way as cherry creams, only in place of the date stone insert a roll of *fondant*.

Peppermint Creams.—Flavour the foundation cream or *fondant* with a few drops essence of peppermint, and form into round flat lozenges.

Cooked Varieties.

Cocoanut Ice. *Ingredients.*—One pound *loaf* sugar, half-pint water, pinch of cream of tartar (*fondant*); quarter-pound dessicated cocoanut. *Method.*—Put above ingredients into a saucepan. *Heat slowly.* Stir frequently until sugar is dissolved. Do not allow the sugar *to boil* until it is quite dissolved, and do not stir *after* the sugar boils. Allow to boil until the syrup can be rolled in a soft ball between the finger and thumb when dropped in cold water. Then allow to cool by standing the saucepan in a basin of cold water. When cooled, stir the mixture with a spoon until it turns thick and white. It is then ready to be used for any cream sweet.

For the Cocoanut Ice, add the cocoanut to the *fondant*. Spread one half on wafer paper, and colour the other half pink by adding a few drops of cochineal, and spread on top of the white. When cool cut up into nice blocks. This costs very little, and sells at 1s. 4d. per pound.

This *fondant* may be used for coffee, peppermint, strawberry, and raspberry creams by using the different flavourings.

N.B.—Marzipan is made by substituting ground almonds for cocoanut, and omitting the colouring.

The confectioner's wafer-paper could be purchased at 1s. 3d. for 100 sheets at Schoolbred's, London, or any other good house.

Raspberry Noyau. *Ingredients.*—One and a quarter pounds loaf sugar (good), half-pint water, one pinch cream of tartar, half-pound raspberry jam, quarter-pound almonds or walnuts, half-teaspoonful raspberry essence, some pink colouring, two sheets confectioner's wafer paper. *Method.*—Put sugar, water, and cream of tartar into pan. Heat very slowly until all the sugar is dissolved, taking care that the sugar *never boils* until quite dissolved, and do not stir *after* it boils. If any scum should rise, remove carefully from the surface, but do not disturb the syrup. Boil until a few drops put into water can be rolled into a soft ball between the finger and thumb. Add the jam to the mixture, boil for a minute or two, and test again with the cold water. Next allow to cool for a quarter of an hour by placing the pan in a basin of cold water. Add the almonds or walnuts roughly chopped, also the flavouring and colouring, and stir with a spoon until the whole mixture becomes thick and cloudy. Lay a sheet of wafer paper on a tin and spread the mixture on this. Place another sheet of paper on top, and press firmly down. When cold, cut in slices.

N.B.—Should crystals form on the side of the pan when boiling the mixture, rub these gently away with a cloth wrung in hot water, otherwise it will burn on the side of the pan and spoil the flavour of the sweets.

Toffee Varieties.

Butter-Scotch. *Ingredients.*—One pound sugar, half pint water, pinch cream of tartar, two ounces butter. *Method.*—Heat the sugar, water, and cream of tartar slowly. Stir until the sugar dissolves, *always remembering* not to allow the sugar to boil until quite dissolved, and not to stir after it boils. This mixture must boil until it turns a pale golden brown, then put in the butter; stir it in just enough to *mix it*. Turn it out on to a buttered tin.

This syrup could be used without the butter for almond rock by adding some browned almonds.

Almond Toffee. *Ingredients.*—Four ounces butter, one pound granulated sugar, half-pound blanched almonds. *Method.*—Melt butter in saucepan, and add the sugar. Boil to the "soft ball" stage, add the blanched almonds, and continue boiling until the sugar will snap when tested. Pour into buttered shallow tin; divide into squares when cool.

Russian Toffee.—To make Russian toffee proper, thick sour cream should be used, but condensed milk will do instead. Add half-pint sour cream to one pound sugar, and boil together until the mixture thickens. Add teaspoonful vanilla essence and a tablespoonful sherry or whisky. Boil again until the mixture leaves the side of the pan clean. Turn into an oiled tin, and when set cut into squares.

(To be continued.)

A COURSE IN HISTORY AND LITERATURE.

SCHEME FOR NOVEMBER—THE COMING OF THE ENGLISH.

BY MABEL A. BROWN.

GRADE I.	GRADE II.	GRADE III.
History—		
1. The home of the English—their country, inhabitants, manner of living, laws, customs, and religion.	1. As for Grade I., in greater detail.	1. As for Grade I.; special attention to religion, government (compare in detail with present day). Description and plan of an old English village.
2. The invasion and conquest of Britain; origin of name England; important names—Hengist, Horsa, Rowena, Ella, Cissa, Ida.	2. Invasion by Jutes into Kent, about 449. Invasion by Saxons on south coast, about 476. Invasion by Angles on east coast, about 547.	2. As for Grade II. Make maps showing course of invasion and settlement.
3. How the English became Christians; stories of the missions of Saints Augustine, Paulinus, Aidan, Columba, etc.	3. Conversion of Kent by Augustine (597). Conversion of Northumbria by Paulinus (627). Story of Aidan, St. Chad, Wilfred of York, etc.	3. As for Grade II. Maps should also be made for this section.
4. First great English writers—Cædmon and Bede. Story of Cædmon and Abbess Hilda of Whitby. Life of Bede.	4. As for Grade I., in greater detail.	4. Biographies of Bede and Cædmon. Show extracts from MSS., and give translations of Cædmon's verse.
Literature—		
To be told to Children. Story of Beowulf, the Saxon hero. Story of Frithiof, the Viking's Son. *Northland Heroes*, by Florence Holbrook (G. Harrap and Co., 6d.). *The Adventures of Beowulf* (Horace Marshall and Son, 9d.).	*To be read by Children.* As for Grade I.; also— *Children of Odin* (H. Marshall, 1s.). *Tales from the Eddas* (G. Harrap, 9d.).	*To be read by Children.* *Readings in English History from Original Sources*, I. (Blackie, 2s.). Bede's *History of the Church of England* (Blackie); English Texts, 6d. *A First Book in English Literature*, Part I., ch. ii., iii. (Horace Marshall, 2s.). *Stories from the Northern Sagas* (H. Marshall, 1s.).
Teachers' Reading for next Three Months.		
Beowulf's Expedition. (Longfellow.) Tegner's Drapa (Balder). (Longfellow.) The Skeleton in Armour. (Longfellow.) The Saga of King Olaf. (Longfellow.)	The Discoverer of the North Cape. (Longfellow.) To an Old Danish Song Book. (Longfellow.)	Balder Dead. (Matthew Arnold.) Voyage to Vinland. (Lowell.) The Valkyries, by Benson (novel).

HISTORY.

The history for this period groups itself chiefly under the following heads:—

1. The home of the invaders—their country, laws, customs, religion, etc.
2. Their conquest of Britain and gradual settlement.
3. The conversion from paganism to Christianity, and its chief agents.
4. The first English literature; stories of Cædmon and Bede.

The Home and Customs of the English.

A map should be made to show the home of the Jutes, Saxons, and Angles, and their various places of settlement in Britain. Change of country's name, derived from Angle-land.

Probable reasons for invasion were overcrowding, and desire for a more fertile land. Their own, a wild uncultivated country, set with forests right down to the water's edge. In Hengist's speech before Vortigern he says: "It is customary among us that when we come to be overstocked with people, our friends from all the provinces meet together, and command all the youths of the kingdom to assemble before them; then, casting lots, they make choice of the strongest and ablest among them to go into foreign nations, to procure themselves subsistence, and free their native country from a superfluous multitude of people" (Geoffrey of Monmouth).

There were three classes of men—

1. Earls, of gentle birth; (2) ceorls, or churls—freemen (share in government, and obliged to bear arms in time of war); (3) thralls, or slaves (no rights, bought and sold like cattle).

The thanes were young men, usually of noble birth, who entered the service of a nobleman, being provided in turn with food and lodging, clothing and armour.

"The homestead or family was the basis of society; clusters of homesteads made the town; groups of towns made up the tribes" (*The Four Nations*). Villages were like oases in the desert. Each village was composed of a group of kinsmen, freemen, owning the land they tilled, and on which their dwellings were built. Next came the village ploughland, divided into three large fields, one of which lay fallow every year, and the others provided crops for the community. Beyond this, again, were the meadow lands, where all the flocks and herds grazed in common. Between one village and the next was the "mark," a belt of moorland, forest, or fen, which isolated the village, protected it, and supplied it with timber. A stranger coming through the "mark" used to blow a horn to announce his coming, otherwise he was liable to be shot as a foe. Each village was practically self-supporting, the inhabitants building their own dwellings, spinning their own wool, making their own clothes, etc. There were smiths, carpenters, ploughmen, herdsmen, merchants, hunters, fowlers, fishers, etc., all of whom worked for their lord, and lived under his protection. In the centre of every village was a tree or hill, which was called the "moot," or meeting-place. Here the men assembled to settle questions and disputes. This was called the village moot. Then there was the hundred moot to settle the affairs of the hundred, so called because it contained about 120 dwellings; the folk-moot, which was the meeting of the tribe; and the witanage-moot, or the meeting of the chief men, or king's advisers. (Compare with our Parliament to-day.) At these moots, laws were passed, questions of right and wrong, peace and war, decided, and punishments meted out. Every man's life was worth so much money, according to his rank. If a man was killed, the money went to his kinsmen, in the case of a slave to his master.

The names of places ending in *ham*, *tun*, *stoke*, *worth*, are all of Saxon origin, and all mean an enclosed or protected place. Rockingham means the home of the sons of Rock. The syllable *-ing* occurs in more than one-tenth of the names of English villages and hamlets. This shows that the people were at one time all related to one another. Basingstoke was the stockaded place of the Basings, etc. (This should be illustrated by reference to local names of places.)

The Conquest of England.

First invasion into Kent by Jutes (about 449). Give story of Hengist and Horsa, and how Vortigern discovered his mistake in asking their assistance. Their settlement in Thanet. Second invasion by Saxons on the south coast (about 476). The taking of Pevensey Castle (show picture of the Roman fortress) by the Saxons, who "left not a Briton alive" (Gildas). Name of South Saxons perpetuated in Sussex. Ælle and his son Cissa conducted this invasion. About 500, another band of Saxons landed on the shores of Southampton Water, and eventually founded Wessex, or the kingdom of the West Saxons. The kingdom of the East Saxons, called Essex, was founded north of the Thames; and finally, about 547, the Angles descended upon the east coast, and founded three kingdoms, hence the name England. The kingdoms were Norfolk (north folk), Suffolk (south folk), and Mercia (middle England). These together formed the greater part of the conquered land. Thus there were in the sixth century seven kingdoms in the land of the conquerors. Maps should be made to illustrate these various settlements, showing how the Britons were driven westward and northward. Lines should be drawn dividing the unconquered from the conquered land. Accurate maps for this may be found in most reliable history books. See Messrs. Horace Marshall's *First History of England*, Part I., p. 57; also Messrs. Nelson's *Highroads of History*, Book IV., p. 41; or Messrs. Blackie's *Oxford Manual of History* Book I., p. 21. I mentioned Messrs. Charles and Dible's maps for children last month.

The Conversion to Christianity.

Tell the stories of the missions of Augustine to Ethelbert of Kent (597); the mission of Paulinus at the court of Edwin of Northumbria (627); also the stories of Aidan, Patrick, Columba, Cuthbert, Wilfred of York, Theodore of Tarsus, all of whom played great parts in the Christianising of England. A great deal of information on this important subject may be gained from Messrs. Blackie's translation of *Bede's History of the English Church* (6d.). *Dramatic Readings in English Literature* gives a very vivid account of the conversion of King Edwin by Paulinus (Messrs. Blackie). Information on this section is abundant in any good history text-book.

The First English Literature.

Great stress should be laid on this section, as at this time the foundation of our literature was laid. The language has undergone many modifications, but its basis is Anglo-Saxon. Specimens of Early English should be shown to the older children. They will be able to trace the likenesses in many words to our language to-day. Suitable selections from Cædmon's verse are given in many popular books. The Beowulf poem is, of course, the first great poem in the English language, but Cædmon is the first poet of whom there is any definite personal record, just as Bede is the first prose writer of whom we know, although the only works of his that remain to us are written in Latin.

Many suitable pictures will be found in the *Highroads of History*, mentioned last month. These books should be passed round the class.

The children will be much interested in the religious belief of their ancestors—with its frank paganism; Odin, Freya, Loki, and their other numerous deities, both good and evil; Valhalla, the heaven of the brave. This section will be taken in greater detail next month, as the religion of Saxons and Danes was very similar. Any one who can borrow Du Chaillu's *Viking Age* will have plenty of reliable information about this period. The book, in two volumes, is published at 36s., which is a somewhat prohibitive price, but it may be seen in some reference libraries. Other good books for reference are Palgrave's *History of the Anglo-Saxons* (Murray), Church's *Count of the Saxon Shore* (Seeley), *Old English Chronicles*, Bohn's Library (Bell), *Stories from the Northern Sagas* (Horace Marshall, 1s.).

THE best course in preparatory literature is provided in

MESSRS. NELSON'S

ROYAL TREASURY OF STORY AND SONG,

which are acknowledged to be the most beautiful literary readers ever published. Send for particulars to 35 Paternoster Row, London, E.C.

N.U.T. NOTES.

BY ALLEN CROFT.

THERE was a time when a teacher possessing a university degree in a primary school was a veritable *rara avis*, and thirty years ago even to have matriculated was regarded as no common feat. To-day, however, graduates are almost as plentiful as blackberries in September, and the time may come when every teacher, both man and woman, must have completed a degree course before being recognised as fully certificated. I admit that before this can be effected a very different attitude towards graduates in primary schools must be adopted by the Board of Education, which, rightly or wrongly, is generally credited with a desire to allow *as few* students as possible in our training colleges to be given the opportunity of gaining university distinctions—*why*, it is not always quite easy to understand. Times have changed so marvellously since the "little white slaves"—Sir John Gorst's historic phrase—of thirteen, and fourteen, and fifteen years of age had to "teach" all day and study all night, that it is now no unusual thing for boys and girls to matriculate before entering on their short term of apprenticeship, and for these, at all events, the acquirement of a degree should be comparatively easy before entering on their life's work.

The Executive and—

Since the beginning of the year a Royal Commission, whose chairman is the Right Hon. R. B. Haldane, K.C., M.P., has been considering the subject of university education in London, its other members being the Right Hon. Viscount Milner, G.C.B., G.C.M.G.; Sir Robert L. Morant, K.C.B.; Mr. Lawrence Currie, M.A.; Mr. W. S. M'Cornick, M.A.; Mr. E. B. Sargant, M.A., LL.D.; and Mrs. Creighton. The terms of reference are too long for me to quote here, but they seem so wide that it is difficult to suggest in what fashion they could possibly have been enlarged.

AMONGST the organisations taking a keen interest in the actions of this Royal Commission one is particularly gratified to notice the Workers' Educational Association, on which body the N.U.T. is represented by that phenomenally youthful sexagenarian, M. W. A. Nicholls, one of the most completely successful Presidents of the Union within my memory. At his request the subject was considered by an Education Committee, which presented to the Executive a lengthy list of recommendations, of which perhaps the following are the chief:—

University Education.

(*a*) The University of London should offer diplomas, to be secured by successive examinations at intervals extending over a number of years. Evening students might spend anything between four and ten years in seeking such a diploma.

(*b*) The university should offer general courses of liberal study suitable for adult work-people who have had little or no formal education since leaving school. Those courses should not be devised for the purpose of bearing an immediate commercial value.

(*c*) Certificates might be granted at each of the successive examinations leading to the final or diploma examination.

(*d*) The matriculation examination should not be a stage towards the acquisition of a diploma, though maintained for all students proposing to secure a university degree.

(*e*) Educational institutions attended mainly by work-people should be represented upon the supreme governing body of the university.

(*f*) Tutorial classes on the lines of the Oxford scheme should be arranged in connection with the London University, and students at such classes recognised as external students of the university.

(*g*) Educational institutions throughout the country, such as training colleges, polytechnics, evening schools, and other educational organisations more particularly designed for work-people, should be linked up with local universities.

(*h*) The British Museum library should be made available for evening research work.

French Prize Competition.

1. All French translations **must be received not later than November 6, 1909,** and addressed to:—PRIZE EDITOR, Office of *The Practical Teacher*, 35 and 36 Paternoster Row, London, E.C.
2. Competitors should cut out and send the *coupon* which appears on the Back Wrapper page of the current number. One coupon must be sent for each entry.

A Prize of Half a Guinea is offered for the best rendering into English of the following extract:—

Eh bien, monsieur de Rastignac, traitez ce monde comme il le mérite. Vous voulez parvenir, je vous aiderai. Vous sonderez combien est profonde la corruption féminine, vous toiserez la largeur de la misérable vanité des hommes. Quoique j'aie bien lu dans ce livre du monde, il y avait des pages qui cependant m'étaient inconnues. Maintenant, je sais tout. Plus froidement vous calculerez, plus avant vous irez. Frappez sans pitié, vous serez craint. N'acceptez les hommes et les femmes que comme des chevaux de poste que vous laisserez crever à chaque relais, vous arriverez ainsi au faîte de vos désirs. Voyez-vous, vous ne serez rien ici si vous n'avez pas une femme qui s'intéresse à vous. Il vous la faut jeune, riche, élégante. Mais, si vous avez un sentiment vrai, cachez-le comme un trésor; ne le laissez jamais soupçonner, vous seriez perdu. Vous ne seriez plus le bourreau, vous deviendriez la victime. Si jamais vous aimez, gardez bien votre secret! ne le livrez pas avant d'avoir bien su à qui vous ouvrirez votre cœur. Pour préserver par avance cet amour qui n'existé pas encore, apprenez à vous méfier de ce monde-ci. Ecoutez-moi, Miguel.....(Elle se trompait naïvement de nom sans s'en apercevoir.) Il existe quelque chose de plus épouvantable que ne l'est l'abandon du père par ses deux filles, qui le voudraient mort: c'est la rivalité des deux sœurs entre elles. Restaud a de la naissance, sa femme a été adoptée, elle a été présentée; mais sa sœur, sa riche sœur, la belle madame. Delphine de Nucingen, femme d'un homme d'argent, meurt de chagrin; la jalousie la dévore, elle est à cent lieues de sa sœur; sa sœur n'est plus sa sœur; ces deux femmes se renient entre elles comme elles renient leur père.

From Le Père Goriot, by H. DE BALZAC.

RESULT OF THE OCTOBER COMPETITION.

The prize is awarded to "D. E. S. P." (Will "D. E. S. P." kindly forward name and address for publication?)

First Class.—Elf Errant, Espérance, U., T. V. D., Floreat Devonia, Téméraire, Clio, Aroer, Claypole, Oyster, Pippo, Colenso, Surprise, Bayard, Anglaise, Assise, Yorick, Paul, Karèyut, Kram, Nemo, Rosalind, Agneau, Scixio, Clapham, Jota, Jean Bonhomme, Dinornis, White Violet, Redwald, Kim, Willoughby, Pimpernel, Amateur, Peter, Tim, K. A. M.

Second Class.—Dahlia, Alroy, Guisienne, Charles Surface, Aspirante, St. Oswald's, Fritz, Fidelis, Bailen, Marguerite, Dodo, Essex, Yvonne, Caliban, Betty, Jane, Curio, Teab.

The name and address of "Kettering," who gained the prize in the last competition, are:—Miss A. F. Fox, Flat 6, 46 Dartmouth Park Hill, London, N.W.

REPORT.

Some very good translations are sent in this month, and there are very few strikingly poor ones. The illative force of *aussi* commencing a sentence escaped some competitors; and some translated *les luttes contre...les infidèles* as "struggles against infidelity." *Les infidèles* means, of course, Mohammedanism typified by the Saracens. Quite a number translated *la mesure* by "propriety." This might probably be one of the dictionary meanings given to the word, but the context shows clearly what it means. *Devait* is not here "ought," nor is *pont* "bridge." *Un peu connu* is not difficult, but many made a difficulty of it. The successful competitor has retained the metaphor in *Tout moine*, etc., linking it very happily, but we believe with little grammatical warrant, to what precedes. The sentence means that every monk who had the least title to fame must have speculated on the mysteries of heaven and hell. Dante was not the first who did so, and in doing so he followed the tendencies of his times.

In answer to *Assise*, we beg to say that for the French Verse Competition the coupon contained in the September or the November issue may be sent.

PRIZE TRANSLATION.

One encounters the same difficulty when one attempts to study the passionate transports of the thirteenth century, its poetic inspirations and chaste visions, contrasting with a background of coarseness, misery, corruption, and madness. Men had every vice then, except vulgarity; every virtue, except moderation: they were either brigands or saints. Life was hard enough to kill off the feeble, so that the characters of the survivors had an energy unknown to us nowadays. Men had to arm against a thousand dangers at any moment, to take a sudden resolution on which hung life or death. Open the chronicle of Fra Salimbene and you will be startled to find that what fills the greater part of it is the account of the annual expeditions of Parma against the neighbouring cities, or of these cities against Parma. What would this chronicle be, if instead of being written by a monk, large-minded, passionately fond of music, and an indefatigable traveller, it had been the work of a soldier? But that is not all. These wars between towns are complicated by civil dissensions; plots are hatched periodically; the conspirators are massacred if discovered, or, triumphant, they exile and massacre. Conceive all this dominated by the great struggles of the Papacy against the Empire, against heretics and infidels, and one will soon realise how hard it is to describe such a time. The imagination haunted by horrible or enchanting sights like those depicted in the frescoes of the Campo Santo of Pisa, men brooded continually over heaven and hell, inquired about them with the feverish curiosity of emigrants who spend their days on board picturing to themselves the corner of America where they are presently to pitch their tent. Every monk at all known must have paced that deck. The poem of Dante is not an isolated work; it is the most beautiful monument of a class which had produced hundreds of compositions, and Dante Alighieri only had to arrange the works of his predecessors and animate them with the quickening breath of his genius.

D. E. S. P.

FRENCH VERSE COMPETITION.

This is open until November 6. See *Practical Teacher* for September, page 166.

Our Query Column.

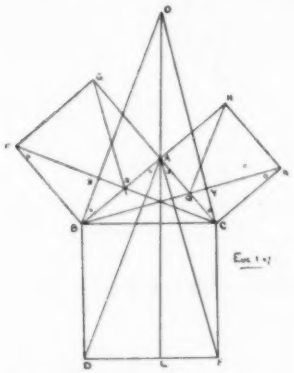
SOLUTIONS BY A. CLEMENT JONES, M.A., PH.D., SENIOR MATHEMATICAL MASTER, BRADFORD GRAMMAR SCHOOL.

RULES.

1. Each correspondent is restricted to *one* question.
2. Each query must be accompanied by the name and address of the correspondent, and the *coupon* which appears on the back wrapper of the current number of the Journal.
3. CORRESPONDENTS MUST IN ALL CASES STATE THE SOURCE FROM WHICH THEIR QUERY HAS BEEN OBTAINED.

The Editor reserves to himself the right to decline to answer any question which is, in his judgment, unsuited to the Magazine.

Togo.—ABC is a triangle right-angled at A; squares are described on its sides (as shown in the figure). Prove (1) the intercepts AQ, AR are equal; (2) the lines CF, BK, AL are concurrent. (Casey's *Sequel*.)



Join HQ, GR, AE, AD.

Now as proved in *Euclid*, I. 47,

$\triangle$ BCK = $\triangle$ AEC in all respects,

hence $\angle$ EAC = $\angle$ BKC.

Similarly, $\triangle$ BFC = $\triangle$ ABD,

and $\angle$ BAD = $\angle$ BFC.

Now $\triangle$ BQC + $\triangle$ CQK

= $\triangle$ BCK

= $\frac{1}{2}$. sq. CAHK

= $\triangle$ CQK + $\triangle$ AQH.

$\therefore$ $\triangle$ BQC = $\triangle$ AQH.

Add $\triangle$ BQA to each, $\therefore$ $\triangle$ BQH = $\triangle$ ABC.

Similarly, $\triangle$ CRG = $\triangle$ ABC.

$\therefore$ $\triangle$ BQH = $\triangle$ CRG.

But the bases of these triangles are each equal to AB + AC, therefore their heights are equal—that is,

AQ = AR.

Now draw CY perpendicular to BK to meet AL at O, then $\angle$ QCY = complement of $\angle$ YCK

= $\angle$ CKY

= $\angle$ CAE. (Proved above.)

$\therefore$ AE is parallel to CO.

But AL is parallel to CE—that is, AOCE is a parallelogram, hence AO = CE.

Similarly, if BX be drawn perpendicular to CF, it meets AL at O′, so that AO′ = BD, and as BD = CE, O and O′ coincide—that is, CY, BX, AL are concurrent.

Now OA, BY, CX are the three perpendiculars of the triangle OBC from the vertices to the opposite sides, hence they are concurrent.

Provost.—Find the limiting value when n is infinite of the n^{th} part of the sum of the n quantities

$$\frac{n+1}{n}, \frac{n+2}{n}, \frac{n+3}{n}, \ldots\ldots \frac{n+n}{n},$$

and show that it is to the limiting value of the n^{th} root of the product of the same quantities as $3e : 8$.

Now $(n+1) + (n+2) + (n+3) \ldots\ldots (n+n)$

$= n^2 + (1 + 2 + 3 + \ldots\ldots + n)$

$= n^2 + \frac{n \cdot n+1}{2} = \frac{3n^2+n}{2}$.

Hence the n^{th} part of the given sum

$$= \frac{3n^2+n}{2n^2} = \frac{3}{2} + \frac{1}{2n},$$

which, when n is very large, is equal to $\frac{3}{2}$.

Again let

$$u = \sqrt[n]{\left(\frac{n+1}{n}\right)\left(\frac{n+2}{n}\right)\ldots\ldots\left(\frac{n+n}{n}\right)},$$

then we have

$$\log u = \frac{1}{n}\left\{\log\left(1+\frac{1}{n}\right) + \log\left(1+\frac{2}{n}\right) + \ldots\ldots + \log\left(1+\frac{n}{n}\right)\right\},$$

and we can expand the logarithmic terms since each is $< \log 2$, hence

$$= \frac{1}{n}\left(\frac{1}{n} + \frac{2}{n} + \ldots\ldots \frac{n}{n}\right) - \frac{1}{2n}\left(\frac{1^2}{n^2} + \frac{2^2}{n^2} + \ldots\ldots + \frac{n^2}{n^2}\right)$$

$$+ \frac{1}{3n}\left(\frac{1^3}{n^3} + \frac{2^3}{n^3} + \ldots\ldots + \frac{n^3}{n^3}\right) - \ldots\ldots$$

But (Edwards, p. 8)

$$Lt_{n=\infty} \frac{1^m + 2^m + 3^m + \ldots\ldots + n^m}{n^{m+1}} = \frac{1}{m+1},$$

hence $Lt \log u = \frac{1}{2} - \frac{1}{2\cdot3} + \frac{1}{3\cdot4} - \frac{1}{4\cdot5} + \ldots\ldots$

$$= \frac{1}{2} - \frac{1}{2} + \frac{1}{3} + \frac{1}{3} - \frac{1}{4} - \frac{1}{4} + \frac{1}{5} + \frac{1}{5} - \ldots\ldots$$

$$= 2\left\{\frac{1}{3} - \frac{1}{4} + \frac{1}{5} - \ldots\ldots\right\}$$

$$= 2\left\{1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{5} \ldots\ldots - \frac{1}{2}\right\}$$

$$= 2 \log 2 - 1.$$

This may also be seen since by definition

$$\frac{1}{n}\left\{\log 1 + \log\left(1+\frac{1}{n}\right) + \ldots\ldots + \log\left(1+\frac{n}{n}\right)\right\}$$

$$= h\{\log 1 + \log(1+h) + \log(1+2h) + \ldots\ldots + \log(1+nh)\},$$

where $nh = 1$; that is,

$$Lt \log u = \int_1^2 \log x \, dx$$

$$= \Big[x \log x - x\Big]_1^2$$

$$= 2 \log 2 - 1.$$

Thus in the limit, when n is infinite, we have

$$\log u = 2 \log 2 - 1$$

$$= 2 \log 2 - \log e$$

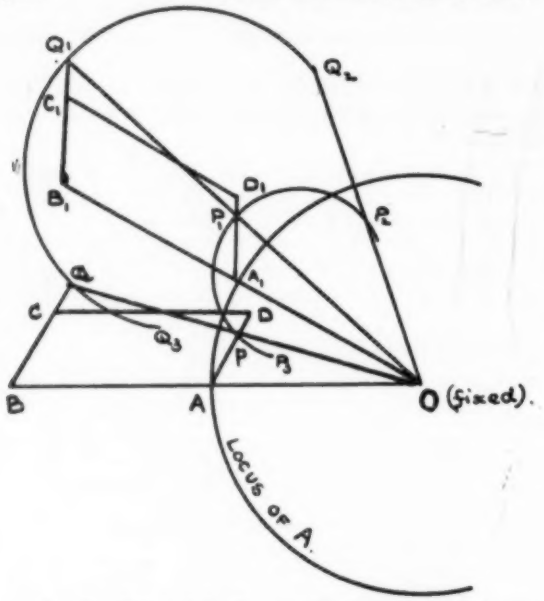
$$= \log \frac{4}{e}.$$

$$\therefore u = \frac{4}{e}.$$

Hence the ratio of the two given quantities (the sum and product)

$$= \frac{3}{2} : \frac{4}{e} = \frac{3e}{8}.$$

South Kirkby.—A parallelogram ABCD is formed of four rods, freely jointed at the corners. The rods BA, BC are prolonged through A and C. O is a fixed point in the prolongation of BA, P is a point in AD, and Q a point in the prolongation of BC such that O, P, Q are in a straight line. Show that if P be made to describe any plane figure, Q will trace out a similar figure. (Board of Education, Stage 3, 1908.)



(*a*) *Possibility of the Construction.*—Let OABCD be one position of the parallelogram, and P the corresponding position of the moved point. Suppose we desire to put P at P_1, then we know OP_1, A_1P_1, and OA_1, the sides of the triangle OA_1P_1; for OP_1 we assume, and the other two sides are fixed lengths.

Construct this triangle, then the parallelogram can be completed, since two sides are given in direction by A_1P_1 and OA_1 and the lengths of the sides are known, hence Q_1 is determined. It follows that P can be made to trace out any curve, provided the triangle OA_1P_1 can be constructed—that is, provided no point P on the curve is such that

$$OP > OA + AP.$$

(*b*) *Proof of Theorem.*—Since AD is parallel to BC, we have

$$OP : OQ = OA : OB = \text{constant},$$

which is the condition that P and Q lie on similar curves. Clearly if PP′, QQ′ are very near positions of the points, since

$$OP : OQ = OP' : OQ',$$

PP′ is parallel to QQ′—that is, the tangents at all pairs of corresponding points on the two curves are parallel.

Note 1.—In the figure I have given part of a circle—namely, P_2P_1P—for the p th of P. A lies on circle centre O, and no point on the path of P must be more than the length AP distant from this circle. P_2P_3 are the extreme points, Q_2Q_1Q is the corresponding circle described by Q.

Note 2.—The arrangement is the principle on which enlarging apparatus is made. O being fixed, a point at P is moved over the outline of a photograph, and a pencil at Q traces out the enlarged copy.

Note 3.—I note you tried to apply the theory of inversion. A curve is not similar to its inverse—for example, a parabola and a cardioid, or a straight line and circle.

F. Tanner.—Prove that $\begin{vmatrix} \sin A & \sin 2A & \sin 3A \\ \sin B & \sin 2B & \sin 3B \\ \sin C & \sin 2C & \sin 3C \end{vmatrix}$

$= 8 \sin A . \sin B . \sin C . (\cos B - \cos C)(\cos C - \cos A)(\cos A - \cos B)$, and show that when $x < 1$

$$\frac{1 - x^2}{1 - 2x \cos a + x^2} = 1 + 2x \cos a + 2x^2 \cos 2a + 2x^3 \cos 3a + \ldots$$

(London B.Sc., 1905.)

Note that (i.) $\sin 2A = 2 \sin A \cos A$,

(ii.) $\sin 3A = 3 \sin A - 4 \sin^3 A = \sin A (4 \cos^2 A - 1)$,

then the determinant

$$= 2 \sin A . \sin B . \sin C . \begin{vmatrix} 1 & \cos A & 4\cos^2 A - 1 \\ 1 & \cos B & 4\cos^2 B - 1 \\ 1 & \cos C & 4\cos^2 C - 1 \end{vmatrix}$$

Take the first row from each of the others, therefore

$$= 2 \sin A . \sin B . \sin C . \begin{vmatrix} 1 & \cos A & 4\cos^2 A - 1 \\ 0 & \cos B - \cos A & 4(\cos^2 B - \cos^2 A) \\ 0 & \cos C - \cos A & 4(\cos^2 C - \cos^2 A) \end{vmatrix}$$

$$= 2 \sin A . \sin B . \sin C . (\cos B - \cos A)(\cos C - \cos A) \begin{vmatrix} 1 & 4(\cos B + \cos A) \\ 1 & 4(\cos C + \cos A) \end{vmatrix}$$

$$= 8 \sin A . \sin B . \sin C (\cos B - \cos A)(\cos C - \cos A)(\cos C - \cos B)$$

$$= 8 \sin A . \sin B . \sin C (\cos B - \cos C)(\cos C - \cos A)(\cos A - \cos B).$$

The identity can be proved in two ways. The second is preferable, because it would be that needed if the result were not known.

Method A.—In the product

$(1 - 2x \cos a + x^2)(1 + 2x \cos a + 2x^2 \cos 2a + 2x^3 \cos 3a + \ldots)$

the coefficient of x^n is

$$2 \cos na - 4 \cos a \cos (n - 1)a + 2 \cos (n - 2)a,$$

which is zero, since

$$2 \cos a \cos (n - 1)a = \cos na + \cos (n - 2)a.$$

This applies to the coefficients of all powers of x greater than the second.

The coefficient of x^2

$$= 1 - 4 \cos^2 a + 2 \cos^2 a$$
$$= 1 - 4 \cos^2 a + 4 \cos^2 a - 2 = -1.$$

The coefficient of x

$$= 2 \cos a - 2 \cos a = 0.$$

The coefficient of x^0 is 1.

Hence the product is $1 - x^2$, provided the series is convergent. But the series is less than

$$1 + 2n + 2n^2 + 2n^3 + \ldots$$

since $\cos na < 1$;

that is, is less than

$$1 + 2x(1 + x + x^2 + x^3 + \ldots),$$

which, if x is < 1, is convergent and has a sum

$$1 + \frac{2x}{1 - x}.$$

Method B.

$$1 - 2x \cos a + x^2 = 1 - x(e^{ia} + e^{-ia}) + x^2 = (1 - xe^{ia})(1 - xe^{-ia}).$$

Hence
$$\frac{1 - x^2}{1 - 2x \cos a + x^2} = \frac{2 - 2x \cos a}{1 - 2x \cos a + x^2} - 1$$
$$= \frac{2 - x(e^{ia} + e^{-ia})}{(1 - xe^{ia})(1 - xe^{-ia})} - 1$$
$$= \frac{1}{1 - xe^{ia}} + \frac{1}{1 - xe^{-ia}} - 1$$

$$= (1 + xe^{ia} + x^2e^{2ia} + x^3e^{3ia} + \ldots) + (1 + xe^{-ia} + x^2e^{-2ia} + x^3e^{-3a} + \ldots) - 1$$
$$= 1 + 2x \cos a + 2x^2 \cos 2a + 2x^3 \cos 3a + \ldots,$$

the identity being true, provided the series is convergent, which we have already shown.

Lambda.—An answer to this query appeared in the July 1908 number.

Stockwell.—There are 4 letters addressed to different houses in a terrace of 10 houses. In how many ways may they be delivered all wrong, not more than one being delivered at any house? (Baker and Bourne's *Algebra.*)

The question is much too difficult for its position in the book. It has been omitted in later editions. The following is a solution:—

It is immaterial which four of the ten houses the four letters are addressed to. We shall call these houses A, B, C, D, and the letters addressed to them *a*, *b*, *c*, *d*.

The work is divided up into five cases, and we shall consider separately the number of ways in which the four letters can be delivered all wrong when letters are left at (i.) none, (ii.) one, (iii.) two, (iv.) three, (v.) four of the houses A, B, C, D.

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(i.) Any method of delivery among the remaining six houses satisfies the condition. The number in this case is therefore the number of permutations of six things four at a time—that is, *360 ways.*

(ii.) Suppose the letter delivered to one of the houses A, B, C, D is letter a, we can deliver it wrongly at B, C, or D—that is, 3 ways. The remaining three delivered at the other six houses are in every case wrong. They can be delivered in ${}^6P_3 = 120$ ways.

Hence when letter a is chosen, the number of wrong deliveries is $3 \times 120 = 360$. But we can equally well under this heading select b, c, or d to deliver at A, B, C, or D—that is, the total number in this case is $4 \times 360 = 1{,}440$ *ways.*

(iii.) Two letters are left at A, B, C, and D. Suppose they are a and b. We can deliver them at BA, BC, BD, CA, DA, CD, DC, so as to be both at wrong houses—that is, 7 ways. The other two left at the remaining six houses are wrong in any case. They can be delivered in ${}^6P_2 = 30$ ways.

Hence for each pair of letters selected the lot can be delivered wrongly in $7 \times 30 = 210$ ways. But we can select the two in six ways, hence the total under this heading is $6 \times 210 = 1{,}260$ *ways.*

(iv.) Suppose the three letters delivered at A, B, C, D are a, b, c, these can be left wrongly at BAD, BCA, BCD, BDA, CAB, CAD, CDA, CDB, DAB, DAC, DCB—that is, in 11 ways. The remaining letter can be left at any one of the six houses—that is, in 6 ways. Hence for the selection a, b, c the lot can go wrong in 66 ways. Now we can select the original three in 4 ways, hence the total under this heading $= 4 \times 66 = 264$ *ways.*

(v.) In this case a, b, c, d are all delivered at A, B, C, or D. They can be left wrongly at BADC, BCDA, BDAC, CADB, CDAB, CDBA, DABC, DCAB, DCBA—that is, in *9 ways.*

Hence the total number of ways is

$$360 + 1440 + 1260 + 264 + 9 = 3333 \text{ ways.}$$

The following less elementary method can be applied to a general case of n houses and r letters, and is therefore worthy of consideration.

Consider the four letters a, b, c, d together with six blank envelopes not to be delivered. In any arrangement of these ten envelopes we are to deliver the letters, missing out the houses where a blank occurs. For example, the arrangement $0, 0, b, 0, a, 0, 0, 0, d, c$ means that the letters addressed to Nos. 1, 2, 3, 4 of the row are delivered at Nos. 5, 3, 10, 9 respectively. The total number of arrangements is therefore the same as the number of permutations of ten things when six are alike—that is, $\frac{|10}{|6}$.

Now suppose any one assigned letter (for example, c) delivered correctly. This will occur in all the possible arrangements of the remaining nine, or, following the above argument, in $\frac{|9}{|6}$ ways—that is, one assigned letter is rightly delivered in $\frac{|9}{|6}$ cases out of the total $\frac{|10}{|6}$.

Similarly two assigned letters are correctly delivered in $\frac{|8}{|6}$ cases, three assigned letters in $\frac{|7}{|6}$ cases, and all four correctly delivered in $\frac{|6}{|6}$ —that is, in one case.

(i.) Now since the letter a is correctly delivered in $\frac{|9}{|6}$ cases, the total number of cases in which a is wrongly delivered is $\frac{|10 - |9}{|6}$.

(ii.) We next proceed to find in how many of the cases in (i.) b is correctly delivered. Altogether b is correctly delivered in $\frac{|9}{|6}$ cases, and in $\frac{|8}{|6}$ both a and b are correctly delivered. Hence in $\frac{|9}{|6} - \frac{|8}{|6}$ b is correctly delivered when a is wrongly delivered. Thus a and b are both wrongly delivered in $\left(\frac{|10}{|6} - \frac{|9}{|6}\right) - \left(\frac{|9}{|6} - \frac{|8}{|6}\right)$ cases—that is, in $\frac{|10 - 2\,|9 + |8}{|6}$ cases.

(iii.) We must now find in how many of the cases in (ii.) c is also correctly delivered.

We start with the assumption that c is correctly delivered. This happens in $\frac{|9}{|6}$ cases.

But in $\frac{|8}{|6}$ both a and c are correctly delivered, hence in $\left(\frac{|9}{|6} - \frac{|8}{|6}\right)$ cases c is correctly delivered, but a incorrectly.

Again in $\frac{|8}{|6}$ cases both b and c are correctly delivered, while in $\frac{|7}{|6}$ cases a, b, and c are correctly delivered—that is, in $\left(\frac{|8}{|6} - \frac{|7}{|6}\right)$ cases b and c are correctly delivered and a incorrectly. Hence in $\left(\frac{|9}{|6} - \frac{|8}{|6}\right) - \left(\frac{|8}{|6} - \frac{|7}{|6}\right) = \frac{|9 - 2\,|8 + |7}{|6}$ cases c is correctly delivered, while a and b are both wrongly delivered. We must subtract these cases from those in case (ii.), and we then get that in

$$\frac{(|10 - 2\,|9 + |8) - (|9 - 2\,|8 + |7)}{|6} = \frac{|10 - 3\,|9 + 3\,|8 - |7}{|6}$$

cases a, b, and c are all wrongly delivered.

(iv.) We can examine in exactly the same way in how many of the cases in (iii.) d is correctly delivered. In case (iii.) the argument was identical with that of case (ii.), except that we started with c correctly delivered—that is, with $\frac{|9}{|6}$ instead of $\frac{|10}{|6}$. So in this case the argument will be identical with the last, but we shall start with $|9$ instead of $|10$, so as to deal only with cases in which d is correctly delivered. Thus *of the cases in* (*iii.*) $\frac{|9 - 3\,|8 + 3\,|7 - |6}{|6}$ are cases in which d is correctly delivered. Hence the number in which a, b, c, and d are wrongly delivered is

$$\frac{(|10 - 3\,|9 + 3\,|8 - |7) - (|9 - 3\,|8 + 3\,|7 - |6)}{|6}$$

$$= \frac{|10 - 4\,|9 + 6\,|8 - 4\,|7 + |6}{|6}$$

$$= \frac{6\,|9 + 44\,|7 + 6}{|6} = 3024 + 308 + 1 = 3333.$$

N.B.—The solution in the general case of n houses and r letters is

$$\frac{1}{|n - r}\left\{|n - \frac{r}{1} \cdot |n - 1 + \frac{r(r-1)}{1 \cdot 2} \cdot |n - 2 - \frac{r - r - 1 \cdot r - 2}{3} \cdot |n - 3 \ldots \pm |n - r\right\}.$$

Vieux Routier.—Your query is unsuitable. Questions requiring for answer an essay on purely descriptive portions of chemistry and physics open up much too wide a ground for any query column. Try the latest edition of Newth's *Chemistry* (Longmans and Co) or Ostwald's works on physical chemistry.

L. A.—Solve the equations

$$a_1x^2 + b_1y = c_1.$$
$$a_2x + b_2y^2 = c_2.$$

These equations can only be solved in particular cases when the coefficients a_1, b_1, c_1; a_2, b_2, c_2 have convenient relations. Theoretically by substituting for y from the first equation in the second we get a quartic equation in y, and this can be solved by the methods of Ferrari and Descartes. The solution in each case depends upon the solution of a cubic equation, which can theoretically be solved by Cardan's method. No useful purpose can be served by a further discussion here, as such general methods are fully dealt with in any Higher Algebra.

NOTE.—In spite of pressure next month owing to reviews of giftbooks, the Query Column will appear as usual.

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Either of these books would make a handsome and valued Christmas present for either a boy or girl.

The Minvern Brothers. By Charles Turley. (T. Nelson and Sons.)

This story, which is dedicated to Mr. J. M. Barrie, is written in a capital style, and is just the sort to keep a boy out of mischief and quite quiet until he reaches the end. The Minvern Brothers are twins, the elder, David, being handicapped by lameness, while Dick is a very "crickety boy," and a recognised authority on the initials of first-class amateurs. Most schoolmasters and some parents will recognise the type. There is much competition between the "houses" composing the school, and "Wetherbee's" loses at football and cricket. However, when Dick arrives at the headship of the house he insists on fielding practice, and by the good fielding of his team wins the match against Harminster. David, despite his lameness, comes to be a bowler, and head of the school. It is a good story, calculated to captivate the reader, be he *pater* or *filius*, and we can assure him of hearty laughter at the expense of the editor of *Wetherbee's Journal*, or the idiosyncrasies of Cox, the house butler. The four illustrations are good.

Lads of the Light Division. By Lieutenant-Colonel A. F. Mockler-Ferryman. (T. Nelson and Sons.)

Every British boy worth his salt will rise like a trout to the Mayfly at this book, which tells of the stirring deeds of Ensign Claverhill and others in the Peninsular War. The author gives a glimpse or two of Lord Wellington (as he then was), of General Crauford, and other leaders of those far-away days when our gallant troops fought against Napoleon's lieutenants in Spain. Interwoven with the purely military side of the story are the life and adventures of Martin Rosevean, the only survivor of a Spanish vessel wrecked on the Scilly Islands, and, as it turns out later, the heir of a great name and vast estates. Martin also takes a hand in the great game of war, and renders notable service, Jack and he, who have been brought up as brothers, sharing many desperate situations. The careful reader will note suggestive parallels between certain of the fights in the Peninsula and some of the battles in the South African War. But we have travelled a long way since the gallant 43rd were nearly wiped out at Badajoz.

The Chancellor's Spy. By Tom Bevan. (T. Nelson and Sons.)

This is the best bit of work Mr. Bevan has done yet. He has succeeded, with no appearance of laboured effort, in giving a most vivid picture of life in the reign of bluff King Hal. The story centres upon the unhappy Lady Mary of England, daughter of Katharine of Aragon, and prospective heir to the throne. The history books do not make Mary very attractive, but Mr. Bevan succeeds in making her even lovable at times, and always interesting. Thomas Cromwell, eaten up with the ambition of making the king absolute, with himself as Henry's right hand and keeper of his conscience, is faithfully portrayed. They were rough-and-tumble days, when plots and counterplots led many a man to the Tower and the headsman's axe, and Mr. Bevan has used his material with consummate ability. Bastian the Burgundian, a former servant of Queen Katharine, and devoted to the Lady Mary, is an excellent character, and the scene in which he at last settles matters with the Chancellor's spy, and defeats Wolsey's clever plot, is most thrilling. There are only two illustrations, but the story is told so vividly that more are scarcely required.

In Days of Danger. By Harold Avery. (T. Nelson and Sons)

It is difficult to realise what a state of excitement must have existed along the southern coast a hundred years ago, when "old Boney" was expected to land almost at any moment. Visitors to Sussex and other southern counties nowadays marvel at the weird martello towers then erected along the shore; but Mr. Avery makes us see the country as it was when Napoleon's troops were practising embarkation, and were anxiously awaiting a chance of landing on perfidious Albion. There is a thread of mystery running through the story which makes it additionally effective, but everything is cleared up satisfactorily. The adventures of Oliver Curtis, who would assuredly have been a boy scout had he lived in this present year of grace, are sufficient to satisfy the most exacting reader, and perhaps to cause a little disappointment that Oliver and not he had the luck to be present at a sea fight on the *Imperative*. Girls will like this book when their brothers have read it, for Millicent Wray is a charming character.

Tanglewood Tales. By Nathaniel Hawthorne. (T. Fisher Unwin.)

Nobody doubts the value and interest that attach to the old myths of Greece, but they seldom appeal to children in the same manner as Western fairy tales. The reason probably is that children are not able to read them in the charming diction of the original, and in a translation there is introduced a strange look and an uncanny form of speech. Many of the old myths contain matter which should be kept from children, and yet, if that matter is pruned away and the tales are told in language familiar to the young, they are full of absorbing interest.

The reading world is under a deep obligation to Hawthorne for presenting these myths in such attractive form. Children have always felt unable to become naturalised citizens of classical lands; but Hawthorne has caused the heroes to settle in the land of our childhood, and has made them speak in familiar language. The present edition, consisting of two sections—*A Wonder Book* and *Tanglewood Tales*—is nicely bound and well illustrated, and will prove a very acceptable Christmas present.

Eric; St. Winifred's; Julian Home. By Dean Farrar. (A. and C. Black.)

Fifty years ago the late Dean of Canterbury, then at the outset of his career, gave the world a picture, drawn largely from his personal experience, of public-school life and its attendant trials and temptations. Half a century sees many changes; public-school life has materially improved, while juvenile literature has undergone so complete a revolution in style that one finds Mr. H. G. Wells pronouncing a blessing on a periodical which in our young days was described as a penny dreadful. In spite of these changes—in spite, too, of the ridicule of a popular writer—*Eric* still holds a high place in public estimation; and when we consider how much Dean Farrar has done to raise the tone of public-school life, both by his writings and by his personal influence at Marlborough and Harrow, the reason of this popularity is not far to seek. From a purely literary point of view, neither *Eric* nor its companion tales could be considered masterpieces—they are written in a straight, interesting manner; but it is their moral atmosphere that gives them their chief charm, and we venture to think that no boy could read these stories without deriving some moral benefit from them. For this reason we are glad to see that they are being issued in a variety of styles to suit the tastes and purses of everybody.

NEW EDUCATIONAL WORKS.

A Text-Book of Botany for Students. By Amy F. M. Johnson, B.Sc. (Allman and Son.)

A young lady, who was placed in the botany class at her school after a two-years' course of chemistry, once told the writer that she was not learning "science, but botany," and it is a very common idea among girls that physical science is intended for the sterner sex, while botany is their own peculiar province. There can be little doubt that if statistics were drawn up showing the relative amount of time given to each branch of scientific study in our girls' schools—particularly in secondary schools for girls—it would be found that botany is far and away the most popular. This being the case, there is a special cause for congratulation that this excellent text-book has been written by a lady. She has, moreover, been assisted entirely by ladies, two of whom are named on the title-page as the illustrators, while the assistance given by others—chiefly former pupils—is acknowledged in the preface.

Modern botany is now such a wide subject, and can be treated from so many points of view, that it will be well to point out in the first place that the book before us does not profess to specialise in any particular branch of the subject or to attend to one aspect only. It takes a general survey of the whole subject, and points out the avenues that lead to special departments. The subject-matter covered includes practically the whole contents of the syllabus of the London University Matriculation

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The instruction given in the book is based on practical work, and copious and clear directions are given throughout for taking observations and carrying out experiments, mostly by the pupils themselves. The writer strongly insists on the need for practical work, and in the preface expresses the hope that the student will "go through the practical work on each chapter *before* that chapter is read." This excellent advice is somewhat counteracted by the arrangement of the book itself, in which the practical work is placed at the *end* of each chapter.

The book is arranged in five parts (and great discretion has been shown in apportioning the amount of space to each), treating respectively of general morphology, histology, physiology, ecology, and systematic botany. Where the whole is treated in such an excellent manner it is difficult to select parts for special praise; but the sections that seem most to appeal to a student are those dealing with the varieties of fruits and seeds, and with the formation and modification of the cell. The section which traces the stages in the reproduction of the fern is particularly good. The book is well up to date in its treatment of the adaptation of plants to their surroundings, which is justly considered the most interesting aspect of the subject.

The section on systematic botany is not too full; it does not profess to be a complete "Flora," but it deals with all the common British plants, and the concise descriptions given will enable the student to recognise most of them. It is, of course, a matter of opinion, but few people will agree with the author in speaking of the "sweetly-scented white flowers" of the privet.

The illustrations in the book are wonderfully accurate, instructive, and artistic, and are the outcome of infinite pains on the part of the accomplished ladies who have assisted the authoress.

Simple Clothing for the Baby. (*Blackie and Son, Limited.*) 6d. *net.*

The book is attractive in appearance. The thick, highly-glazed paper and the clear photographs of the actual garments make it a delight to turn over its leaves. The patterns are just such simple, convenient ones as will make them valuable for any mother. They are equally valuable for the girls in elementary schools for whom they are intended, as they are quite within the compass of such young girls. The baby's nightdress, made very sensibly of woollen material, and constructed so as to draw up at the bottom, will keep the little one snug and warm, even if it *does* throw off the bedclothes. A little less fullness round the neck would add comfort to the wearer. The knitted garments, besides being simple, are so eminently easy and suitable that they should commend themselves to teachers who do not make use of the "Forward" scheme in its entirety. The price of the book puts it within the reach of most schoolgirls of learning age. The omission of the numbers of the pages makes reference to the contents page somewhat confusing.

Teacher's Handbook to "Simple Clothing for the Baby." (*Blackie and Son, Limited.*) 2s. *net.*

For the *aim* of this book we have nothing but admiration and praise. It is essentially practical, and proceeding as it does on the lines which skilled housewives usually adopt, it will meet with the appreciation of mothers of families, and it should receive the hearty support of teachers, as it will really train girls to think and act for themselves.

It is with great pleasure that we notice that it discards the idea that "if you teach a girl to make a pattern by either measuring or folding, you are teaching her to *cut out*." An ordinary needlewoman does not *make* a pattern before she starts a garment, she either borrows or buys one. That being so, much of the time spent over "cutting out" in girls' schools is absolutely wasted, and would be much more beneficially employed in showing how to make use of patterns. We have always advocated in this journal the necessity for giving power and ability to girls, instead of simply teaching them how to make any one garment. Even the new Needlework Circular retains the old idea that making a garment during the school year is teaching a girl to sew. Evidently the experience of the last thirty years has not yet shown the futility of that method of instruction.

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The flap-pocket in the back of the book is a capital arrangement for keeping the patterns together.

We wish for the manual a very wide sale.

Principles and Methods of Moral Training, with Special Reference to School Discipline. By J. Welton, M.A., Professor of Education in the University of Leeds, author of "Principles and Methods of Teaching," etc., and F. G. Blandford, M.A., Lecturer in Education in the Cambridge University Training College. (*W. B. Clive, University Tutorial Press, Limited.*)

In order to arrive at a just estimate of this work, it is necessary to keep in mind the limitations of the aim which the writers have in view. Perhaps the best key to their position is given in the short title on the back of the volume, "Moral Training through School Discipline." The theme is not moral education as a complete result of instruction and training combined, but rather school discipline as a factor in moral training. This theme is sufficiently wide and deep, with all its limitations, to give scope for a good and useful treatise; and the treatise before us well deserves that description. Both in the theoretical and in the practical portions of the discussion the writing is terse and to the point—a feature not always prominent in books on the moral aspects of education. The more directly practical portions are marked by a grateful saneness and moderation of view, explained, doubtless, by the statement in the preface, "Our joint experience has covered, we believe, day and boarding schools of almost every type." The result of this experience is clearly seen throughout what many teachers will regard as the best part of the book—namely, the chapters dealing with "The School Community," "Exercise of Discipline," "Disciplinary Organisation of the School," "The Relation between the School and the Home," and "Stimulus and Restraint."

In the earlier portion of the book the treatment is, in form at least, more theoretical, but here also the practical experience of the writers has not only enabled them to make the discussions of "Habit," "Duty," "Virtue," and "Conscience" illuminating and suggestive, but also to give these topics a real and intimate relation with the practical discussions which follow. This is in itself an accomplishment of no small moment. To the young teacher especially it is of the utmost importance to perceive clearly the ethical value of the ordinary school routine and the theoretical justification of his everyday practice, which otherwise is apt to degenerate into mechanical processes.

It is but cheap criticism of any book to blame it for the absence of what it does not profess to contain, and we have tried to guard against this in our opening sentences. Yet we have been strongly impressed with a feeling of incompleteness in the book, and this is partly due to the excellence of the theoretical chapters just mentioned. We feel that these chapters provide a rational basis for much more than the exposition of school discipline by which they are followed. They prepare the way, if only incidentally, for a wider discussion, as such quotations as these may indicate: "It is evident that wisdom should grow with years, but equally evident that it can do so only on the condition that the capacity for moral understanding is exercised." "There is, then, a two-fold duty resting on the educators of children, and, consequently, on the school as an educative organisation. While fostering habitudes and habits, they must yet keep the moral intelligence alert and give enlightenment to the moral understanding. In a word, moral teaching as well as moral training is required." "Unless the children be trained to begin thinking on moral questions within their experience, their moral habitudes will become mere blind prejudices." Such statements as these indicate a much wider view of education in its moral bearings than merely the training afforded by school life and organisation, and one cannot but regret that the writers did not plan the practical portion of their work on a larger scale, and treat of the problems of moral instruction with the same moderation and clearness of view as they have applied to the questions of school discipline. Both are necessary, and we hope that our writers, having dealt with the latter in the book now before us, may be encouraged by its success to continue their collaboration in a further volume on the much discussed but yet somewhat obscure subject of moral instruction as a factor in education.

In the meantime, we should like to recommend this work most cordially to all teachers, both in secondary and in elementary schools. Alike in its analysis of the teacher's problem—the development of moral character—and in its discussion of the various means at his disposal for furthering this development—the corporate life of the school and its organised activities—the book is marked by a philosophic insight and a practical suggestiveness which are rarely combined in such a treatise. Problems are fairly faced, and no attempt is made to explain away the residual difficulties which even the best theories leave unsolved on the teacher's hands. Its avoidance of extreme views and its recognition of the limitations of the teacher's influence will do much to win favour for the book among a class who are inclined to be somewhat sceptical regarding the value of educational literature of this type.

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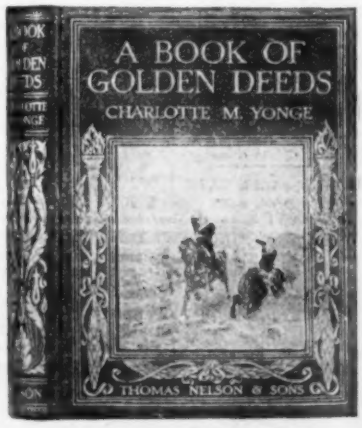

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